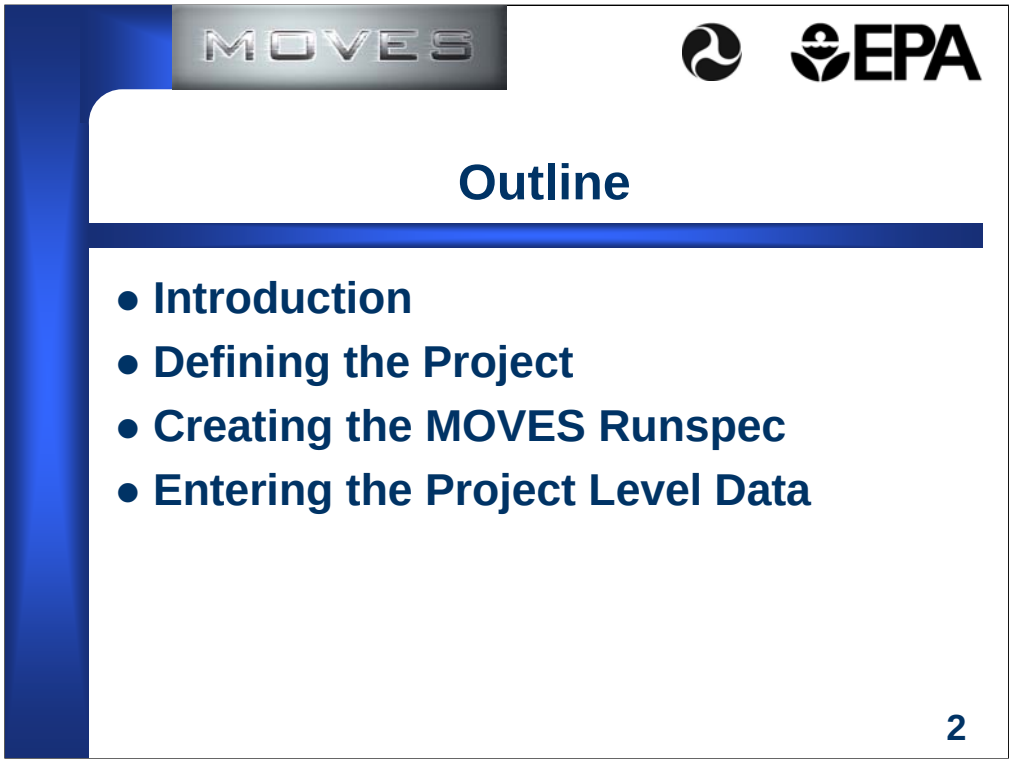
An Introduction to MOVES:
Project Level Modeling

FHWA Resource Center
EPA Office of Transportation and Air Quality

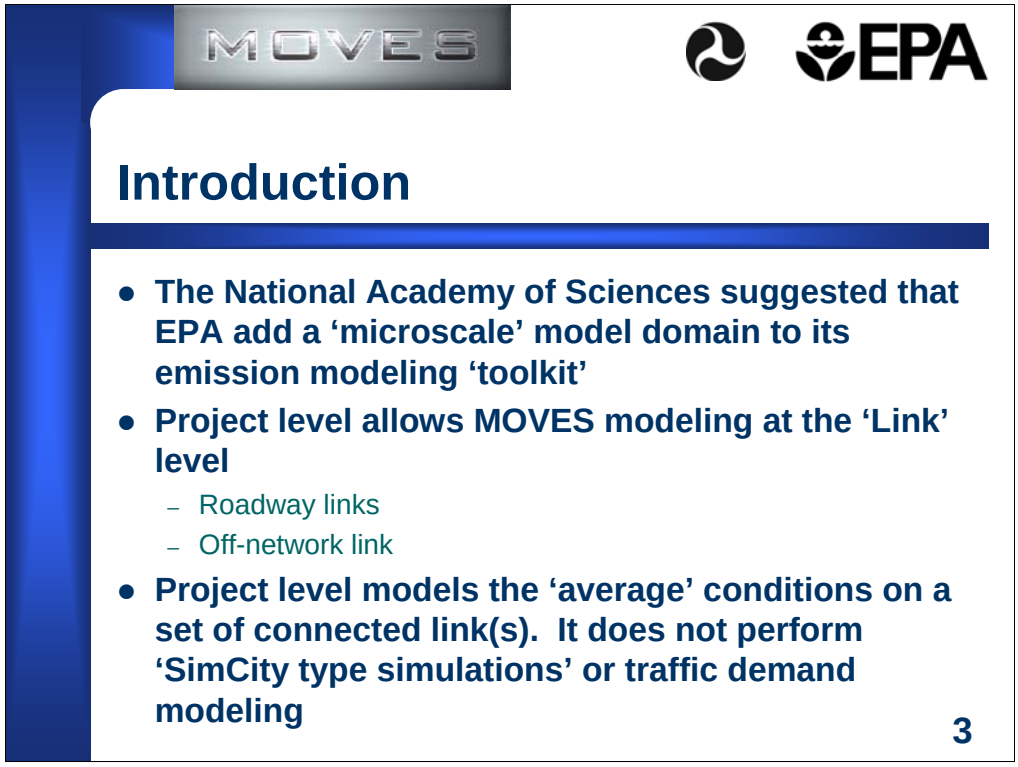
EPA-420-B-09-019



Project Domain/Scale is the finest level of modeling in MOVES.

It allows the user to model the emission effects from a group of specific roadway links and/or a single off-network common area.

The definition of a roadway link is a section of any road where a vehicle is moving for more than three seconds.



An off-network common area may include project boundaries where vehicle starts, extended idling and evaporative emissions are produced.

The use of the Project Domain/Scale requires the user to completely define the individual project (i.e., specify all individual roadway links and/or off-network common area).

The MOVES Project Domain/Scale will utilize MOVES emission rates and other factors to correctly calculate emission inventory results for the user's defined project.

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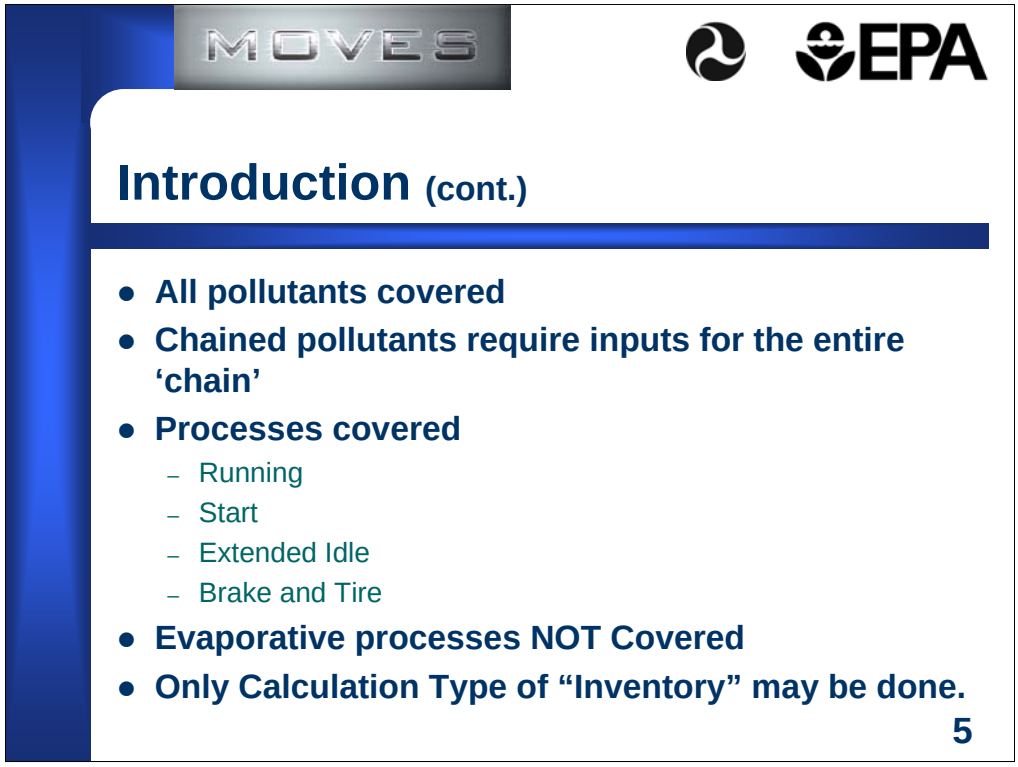
Introduction (cont.)

- Utilizes MOVES emission rates and correction factors
- It does NOT utilize the regular MOVES growth, VMT or population data. These must be supplied by the user.
- It allows the user to specify only one combination of … per run
  - County
  - Year
  - Month
  - Hour



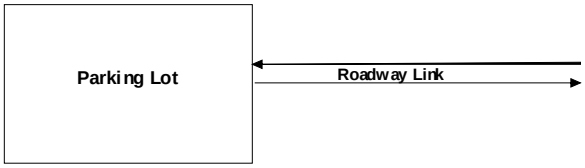
DRAFT MOVES2009 is not capable of modeling any evaporative emission processes when using **Project Domain/Scale**. EPA plans to remedy this feature in future versions of MOVES.

Only the Inventory Calculation Type may be selected in conjunction with the Project Domain/Scale.

Example Project

Define the Project

Basic Schematic of the Project



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Project Assumptions

- Only two links (inbound and outbound from a parking lot) exist.
- The two links and the off-network link are independent
- The off-network link consists of parking, extended idle and starts.
- Only heavy-duty combination long-haul diesel trucks are present on the roadway
- Only nitrogen oxide emissions are included.
- Only one hour of operation is considered.

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Specific Project Data (parameters)

Parameter Name	Parameter
Location County	Washtenaw County, MI
Calendar Year	2009
Month	January
Weekday/Weekend	Weekday
Time	11:00 PM to 11:59:59 PM
Temperature	28.5 F
Humidity	69.5 %
Roadtype of links	Rural Unrestricted Access

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Specific Project Data (link data)

Parameter Name	Parameter
Roadway Link Length	0.998 miles
Link Traffic Volume - In	100 trucks per hour
Link Traffic Volume - Out	10 trucks per hour
Link Average Speed - In	28.5 miles per hour
Link Average Speed – Out	28.5 miles per hour

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Specific Project Data (Off-network data)

Parameter Name	Parameter
Average Vehicle Population	200 vehicles
Start Fraction	0.03
Extended Idle Fraction	0.90
Parked Vehicle Fraction	0.09

Specific Project Data (start data)

OpmodeID Code	Operating Mode Description	Operating Mode Fraction
101	Soak Time < 6 minutes	0.00
102	6 minutes <= Soak Time < 30 minutes	0.05
103	30 minutes <= Soak Time < 60 minutes	0.30
104	60 minutes <= Soak Time < 90 minutes	0.10
105	90 minutes <= Soak Time < 120 minutes	0.50
106	120 minutes <= Soak Time < 360 minutes	0.00
107	360 minutes <= Soak Time < 720 minutes	0.00
108	720 minutes <= Soak Time	0.05
200	Extended Idle	1.00

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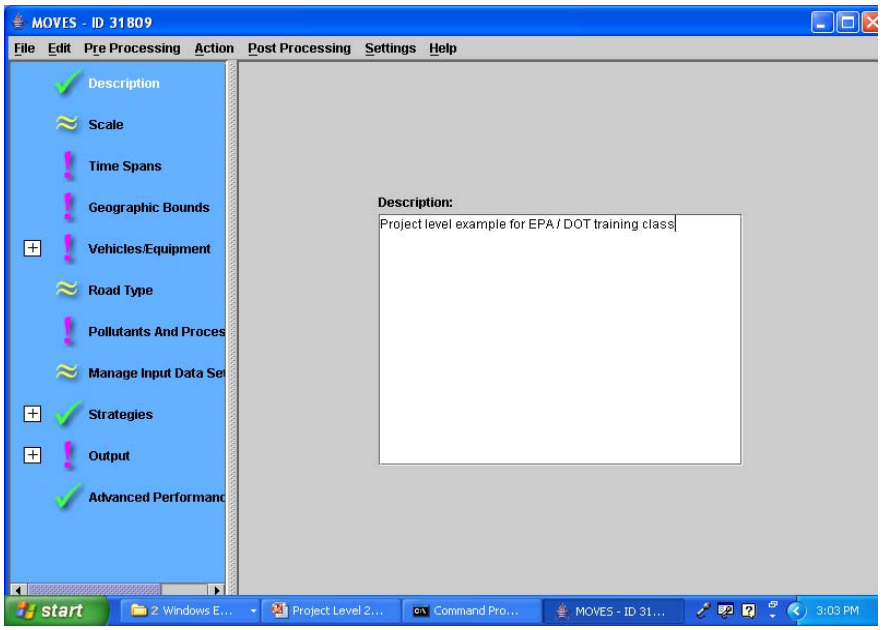
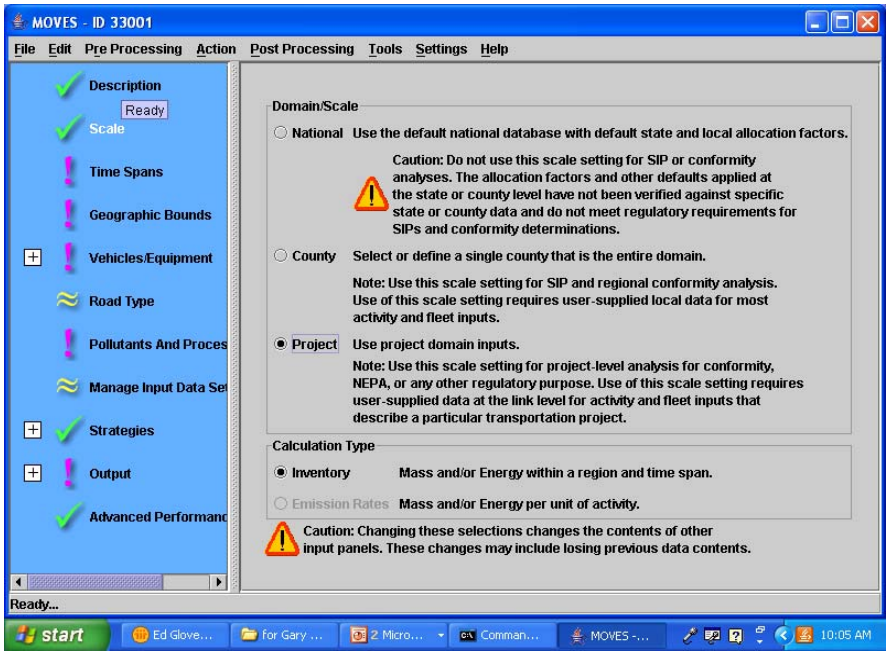
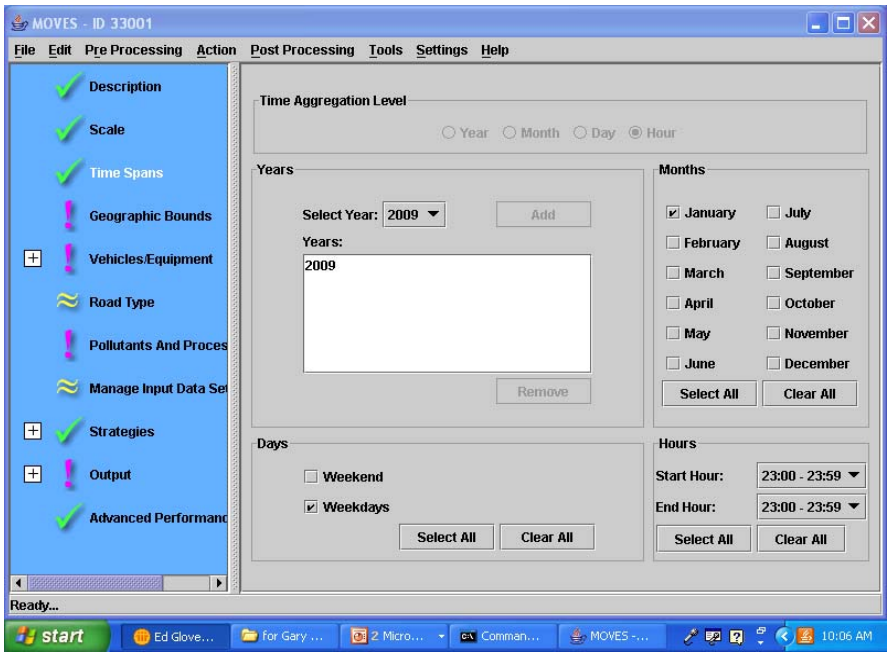
Spreadsheet Inputs

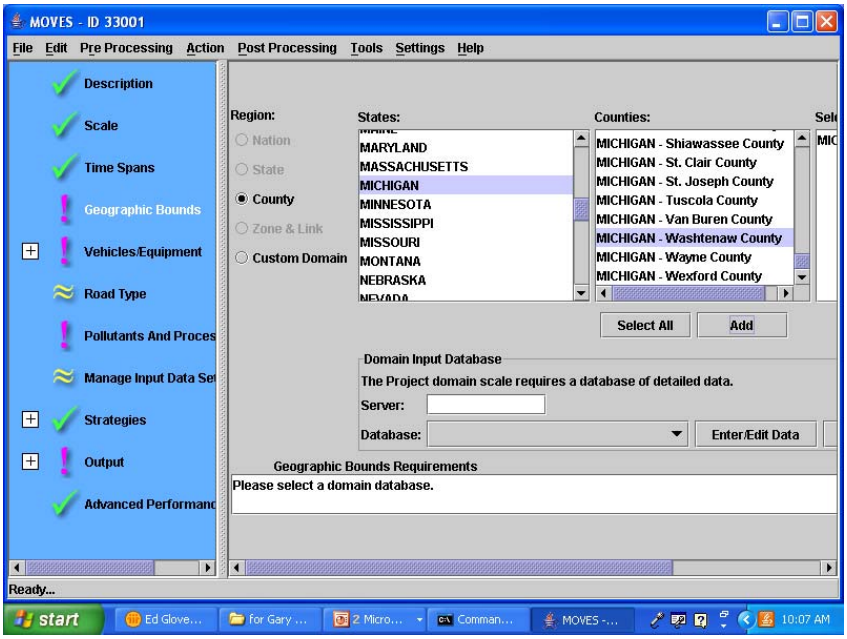
- DriveScheduleSecondLink
- OffNetworkLink
- ZoneMonthHour (temperature)
- LinkSourceTypeHour
- SourcetypeAgeDistribution
- FuelSupply
- Link
- OpModeDistribution

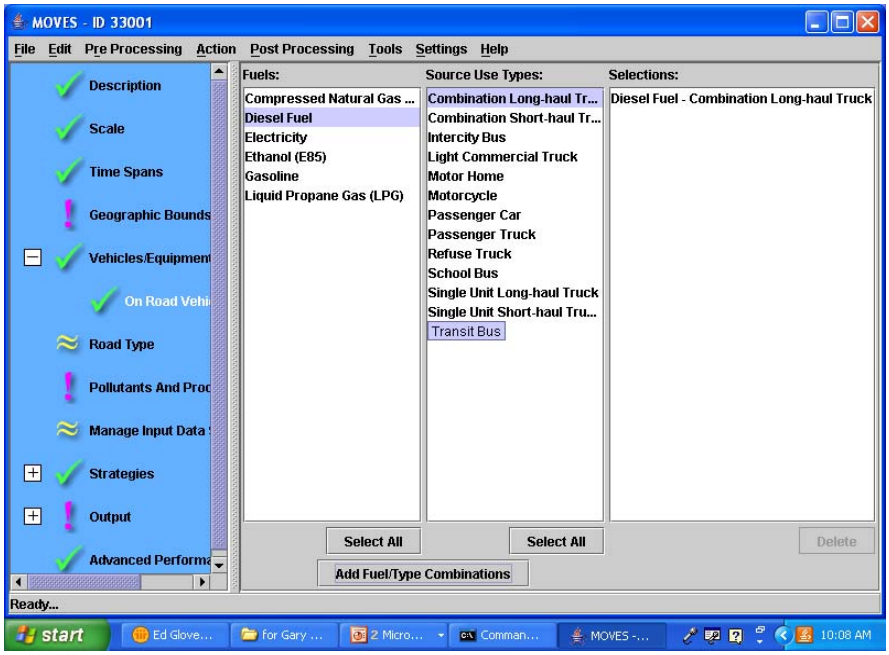
Creating a MOVES Runspec

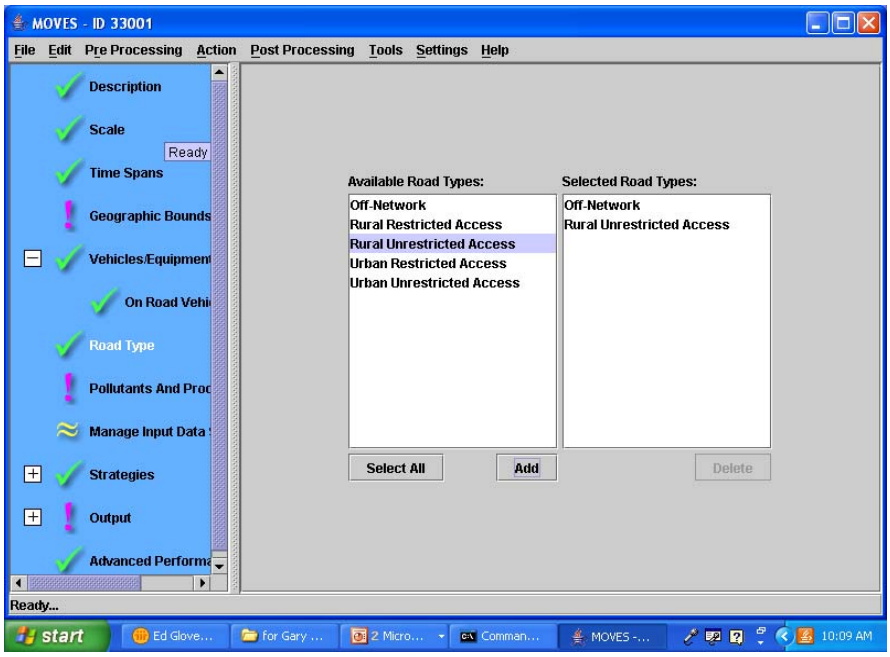

MOVES - ID 31809
File Edit Pre Processing Action Post Processing Settings Help
Description
Scale
Time Spans
Geographic Bounds
Vehicles/Equipment
Road Type
Pollutants And Proces
Manage Input Data Se
Strategies
Output
Advanced Performanc
Description:
Project level example for EPA / DOT training class
start
2 Windows E...
Project Level 2...
Command Pro...
MOVES - ID 31...
3:03 PM

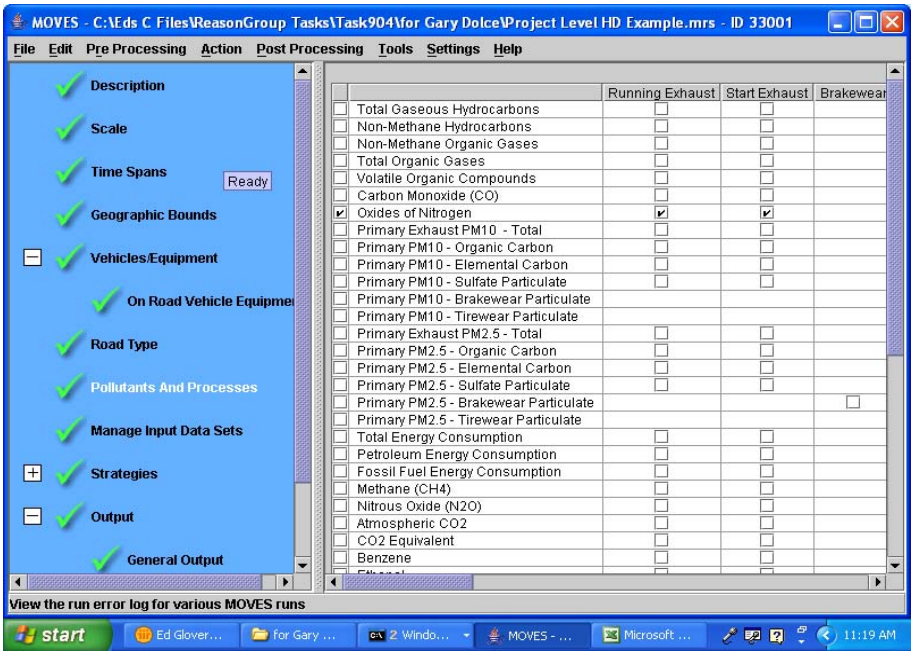

MOVES - ID 33001
File Edit Pre Processing Action Post Processing Tools Settings Help
Description
Ready
Scale
Time Spans
Geographic Bounds
Vehicles/Equipment
Road Type
Pollutants And Proces
Manage Input Data Se
Strategies
Output
Advanced Performanc
Domain/Scale
National Use the default national database with default state and local allocation factors.
Caution: Do not use this scale setting for SIP or conformity analyses. The allocation factors and other defaults applied at the state or county level have not been verified against specific state or county data and do not meet regulatory requirements for SIPs and conformity determinations.
County Select or define a single county that is the entire domain.
Note: Use this scale setting for SIP and regional conformity analysis. Use of this scale setting requires user-supplied local data for most activity and fleet inputs.
Project Use project domain inputs.
Note: Use this scale setting for project-level analysis for conformity, NEPA, or any other regulatory purpose. Use of this scale setting requires user-supplied data at the link level for activity and fleet inputs that describe a particular transportation project.
Calculation Type
Inventory Mass and/or Energy within a region and time span.
Emission Rates Mass and/or Energy per unit of activity.
Caution: Changing these selections changes the contents of other input panels. These changes may include losing previous data contents.
Ready...
start
Ed Glove...
for Gary ...
2 Micro...
Comman...
MOVES -...
10:05 AM

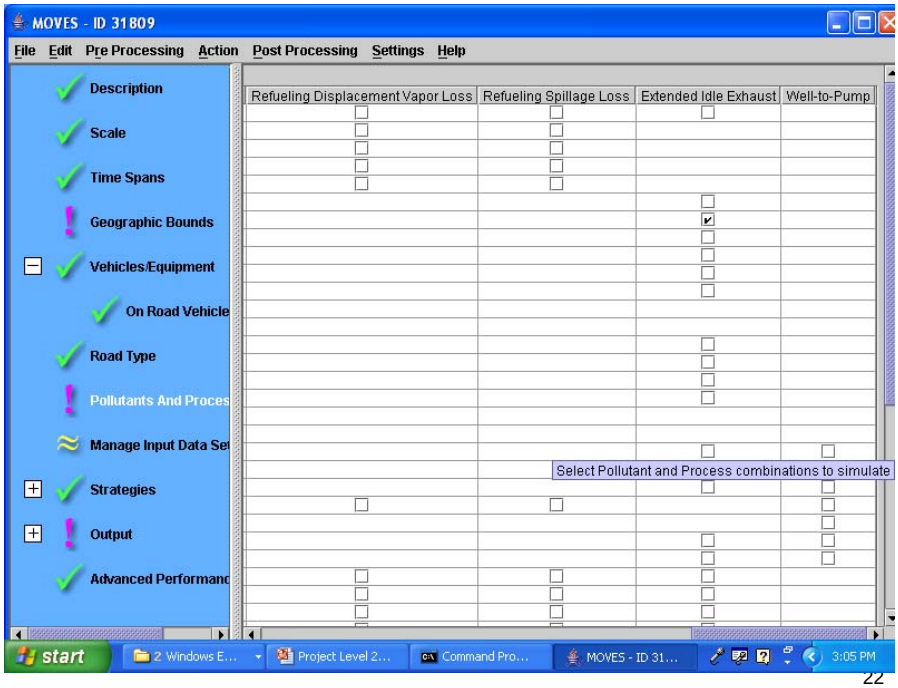

MOVES - ID 33001
File Edit Pre Processing Action Post Processing Tools Settings Help
Description
Scale
Time Spans
Geographic Bounds
Vehicles/Equipment
Road Type
Pollutants And Proces
Manage Input Data Se
Strategies
Output
Advanced Performanc
Time Aggregation Level
Year Month Day Hour
Years
Select Year: 2009
Add
Years:
2009
Remove
Months
January July
February August
March September
April October
May November
June December
Select All Clear All
Days
Weekend
Weekdays
Select All Clear All
Hours
Start Hour: 23:00 - 23:59
End Hour: 23:00 - 23:59
Select All Clear All
Ready...
start
Ed Glove...
for Gary ...
2 Micro...
Comman...
MOVES -...
10:06 AM

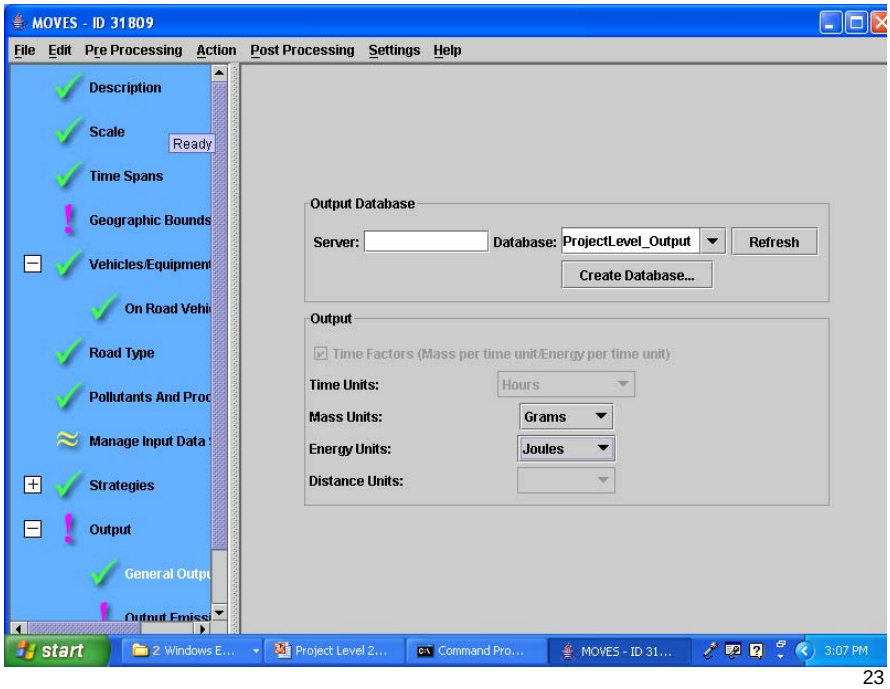

MOVES - ID 33001
File Edit Pre Processing Action Post Processing Tools Settings Help
Description
Scale
Time Spans
Geographic Bounds
Vehicles/Equipment
Road Type
Pollutants And Proces
Manage Input Data Se
Strategies
Output
Advanced Performanc
Region:
Nation
State
County
Zone & Link
Custom Domain
States:
MARYLAND
MASSACHUSETTS
MICHIGAN
MINNESOTA
MISSISSIPPI
MISSOURI
MONTANA
NEBRASKA
Counties:
MICHIGAN - Shiawassee County
MICHIGAN - St. Clair County
MICHIGAN - St. Joseph County
MICHIGAN - Tuscola County
MICHIGAN - Van Buren County
MICHIGAN - Washtenaw County
MICHIGAN - Wayne County
MICHIGAN - Wexford County
Select All
Add
Domain Input Database
The Project domain scale requires a database of detailed data.
Server:
Database:
Enter/Edit Data
Geographic Bounds Requirements
Please select a domain database.
Ready...
start
10:07 AM

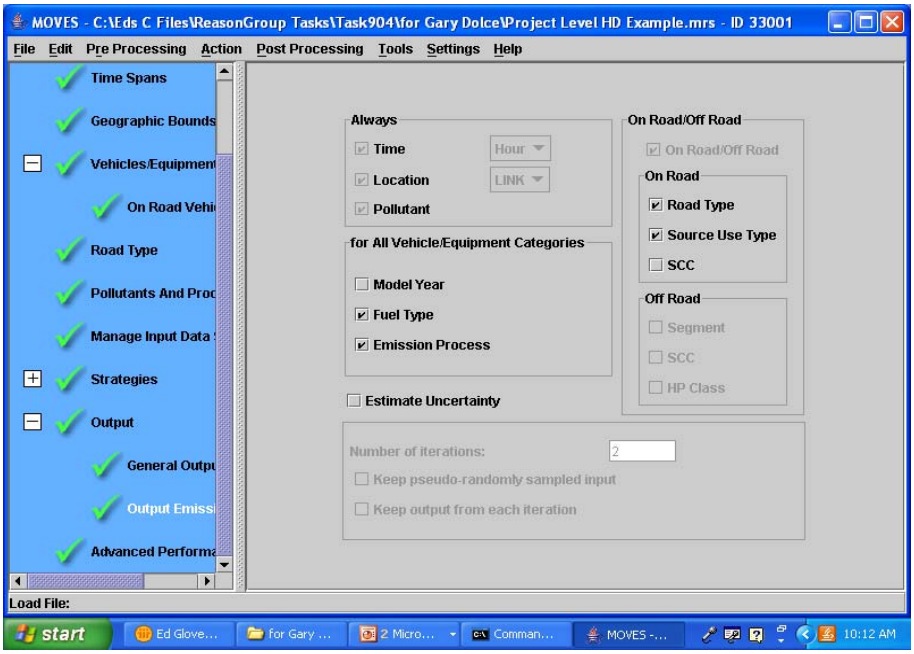

MOVES - ID 33001
File Edit Pre Processing Action Post Processing Tools Settings Help
Description
Scale
Time Spans
Geographic Bounds
Vehicles/Equipmen
On Road Vehi
Road Type
Pollutants And Proc
Manage Input Data
Strategies
Output
Advanced Perform
Fuels:
Compressed Natural Gas ...
Diesel Fuel
Electricity
Ethanol (E85)
Gasoline
Liquid Propane Gas (LPG)
Source Use Types:
Combination Long-haul Tr...
Combination Short-haul Tr...
Intercity Bus
Light Commercial Truck
Motor Home
Motorcycle
Passenger Car
Passenger Truck
Refuse Truck
School Bus
Single Unit Long-haul Truck
Single Unit Short-haul Tru...
Transit Bus
Selections:
Diesel Fuel - Combination Long-haul Truck
Select All
Select All
Delete
Add Fuel/Type Combinations
Ready...
start
Ed Glove...
for Gary ...
2 Micro...
Comman...
MOVES -...
10:08 AM

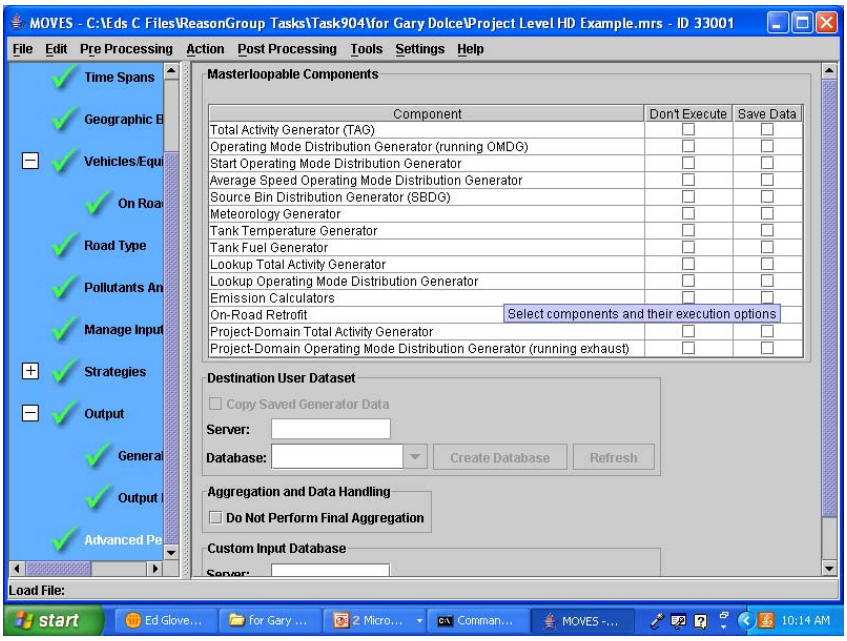

MOVES - ID 33001
File Edit Pre Processing Action Post Processing Tools Settings Help
Description
Scale
Ready
Time Spans
Geographic Bounds
Vehicles/Equipment
On Road Vehi
Road Type
Pollutants And Proc
Manage Input Data
Strategies
Output
Advanced Performa
Available Road Types:
Off-Network
Rural Restricted Access
Rural Unrestricted Access
Urban Restricted Access
Urban Unrestricted Access
Selected Road Types:
Off-Network
Rural Unrestricted Access
Select All
Add
Delete
Ready...
start
Ed Glove...
for Gary ...
2 Micro...
Comman...
MOVES -...
10:09 AM

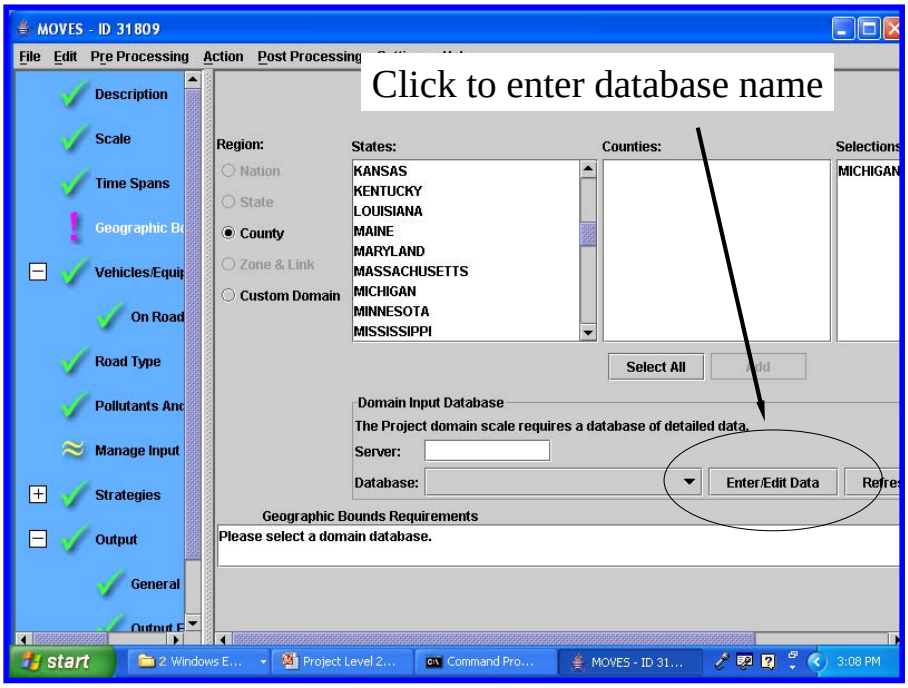

MOVES - C:\Eds C Files\ReasonGroup Tasks\Task904\for Gary Dolce\Project Level HD Example.mrs - ID 33001
File Edit Pre Processing Action Post Processing Tools Settings Help
Description
Scale
Time Spans
Ready
Geographic Bounds
Vehicles/Equipment
On Road Vehicle Equipme
Road Type
Pollutants And Processes
Manage Input Data Sets
Strategies
Output
General Output
Running Exhaust
Start Exhaust
Brakewear
Total Gaseous Hydrocarbons
Non-Methane Hydrocarbons
Non-Methane Organic Gases
Total Organic Gases
Volatile Organic Compounds
Carbon Monoxide (CO)
Oxides of Nitrogen
Primary Exhaust PM10 - Total
Primary PM10 - Organic Carbon
Primary PM10 - Elemental Carbon
Primary PM10 - Sulfate Particulate
Primary PM10 - Brakewear Particulate
Primary PM10 - Tirewear Particulate
Primary Exhaust PM2.5 - Total
Primary PM2.5 - Organic Carbon
Primary PM2.5 - Elemental Carbon
Primary PM2.5 - Sulfate Particulate
Primary PM2.5 - Brakewear Particulate
Primary PM2.5 - Tirewear Particulate
Total Energy Consumption
Petroleum Energy Consumption
Fossil Fuel Energy Consumption
Methane (CH4)
Nitrous Oxide (N2O)
Atmospheric CO2
CO2 Equivalent
Benzene
View the run error log for various MOVES runs
start
Ed Glover...
for Gary ...
2 Windo...
MOVES - ...
Microsoft ...
11:19 AM

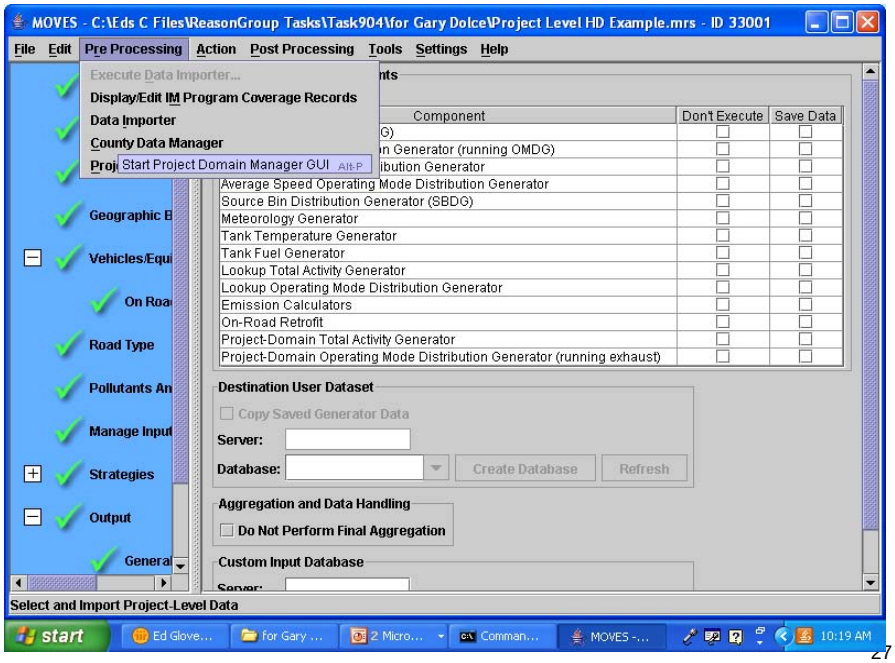

MOVES - ID 31809
File Edit Pre Processing Action Post Processing Settings Help
Description
Scale
Time Spans
Geographic Bounds
Vehicles/Equipment
On Road Vehicle
Road Type
Pollutants And Proces
Manage Input Data Se
Strategies
Output
Advanced Performanc
Refueling Displacement Vapor Loss
Refueling Spillage Loss
Extended Idle Exhaust
Well-to-Pump
Select Pollutant and Process combinations to simulate
start
2 Windows E...
Project Level 2...
Command Pro...
MOVES - ID 31...
3:05 PM


MOVES - ID 31809
File Edit Pre Processing Action Post Processing Settings Help
Description
Scale
Ready
Time Spans
Geographic Bounds
Vehicles/Equipment
On Road Vehi
Road Type
Pollutants And Proc
Manage Input Data
Strategies
Output
General Outpu
Output Emissi
Output Database
Server:
Database: ProjectLevel_Output
Refresh
Create Database...
Output
Time Factors (Mass per time unit/Energy per time unit)
Time Units: Hours
Mass Units: Grams
Energy Units: Joules
Distance Units:
start
2 Windows E...
Project Level 2...
Command Pro...
MOVES - ID 31...
3:07 PM

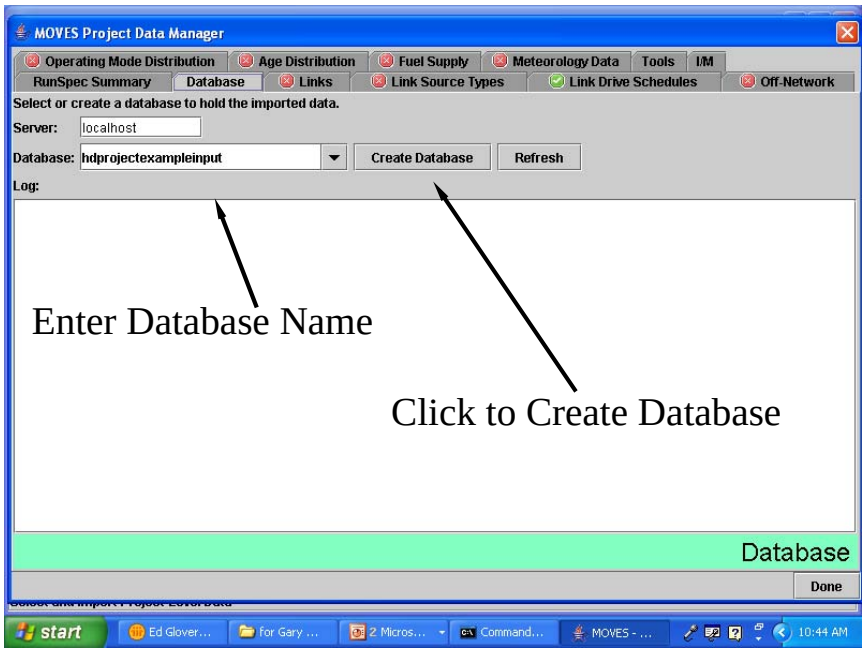

MOVES - C:\Eds C Files\ReasonGroup Tasks\Task904\for Gary Dolce\Project Level HD Example.mrs - ID 33001
File Edit Pre Processing Action Post Processing Tools Settings Help
Time Spans
Geographic Bounds
Vehicles/Equipment
On Road Vehi
Road Type
Pollutants And Proc
Manage Input Data
Strategies
Output
General Outpu
Output Emissi
Advanced Performa
Always
Time
Hour
Location
LINK
Pollutant
for All Vehicle/Equipment Categories
Model Year
Fuel Type
Emission Process
Estimate Uncertainty
On Road/Off Road
On Road/Off Road
On Road
Road Type
Source Use Type
SCC
Off Road
Segment
SCC
HP Class
Number of iterations:
2
Keep pseudo-randomly sampled input
Keep output from each iteration
Load File:
start
Ed Glove...
for Gary ...
2 Micro...
Comman...
MOVES -...
10:12 AM


MOVES - C:\Eds C Files\ReasonGroup Tasks\Task904\for Gary Dolce\Project Level HD Example.mrs - ID 33001
File Edit Pre Processing Action Post Processing Tools Settings Help
Time Spans
Geographic B
Vehicles/Equi
On Roa
Road Type
Pollutants An
Manage Input
Strategies
Output
Genera
Output
Advanced Pe
Masterloopable Components
Component
Don't Execute
Save Data
Total Activity Generator (TAG)
Operating Mode Distribution Generator (running OMDG)
Start Operating Mode Distribution Generator
Average Speed Operating Mode Distribution Generator
Source Bin Distribution Generator (SBDG)
Meteorology Generator
Tank Temperature Generator
Tank Fuel Generator
Lookup Total Activity Generator
Lookup Operating Mode Distribution Generator
Emission Calculators
On-Road Retrofit
Select components and their execution options
Project-Domain Total Activity Generator
Project-Domain Operating Mode Distribution Generator (running exhaust)
Destination User Dataset
Copy Saved Generator Data
Server:
Database:
Create Database
Refresh
Aggregation and Data Handling
Do Not Perform Final Aggregation
Custom Input Database
Server:
Load File:
start
Ed Glove...
for Gary ...
2 Micro...
Comman...
MOVES -...
10:14 AM


MOVES - ID 31809
File Edit Pre Processing Action Post Processing
Click to enter database name
Description
Scale
Time Spans
Geographic Bo
Vehicles/Equip
On Road
Road Type
Pollutants And
Manage Input
Strategies
Output
General
Region:
Nation
State
County
Zone & Link
Custom Domain
States:
KANSAS
KENTUCKY
LOUISIANA
MAINE
MARYLAND
MASSACHUSETTS
MICHIGAN
MINNESOTA
MISSISSIPPI
Counties:
Selections:
MICHIGAN
Select All
Domain Input Database
The Project domain scale requires a database of detailed data.
Server:
Database:
Enter/Edit Data
Geographic Bounds Requirements
Please select a domain database.
start
2 Windows E...
Project Level 2...
Command Pro...
MOVES - ID 31...
3:08 PM


MOVES - C:\Eds C Files\ReasonGroup Tasks\Task904\for Gary Dolce\Project Level HD Example.mrs - ID 33001
File Edit Pre Processing Action Post Processing Tools Settings Help
Execute Data Importer...
Display/Edit IM Program Coverage Records
Data Importer
County Data Manager
Start Project Domain Manager GUI Alt-P
Component
Don't Execute
Save Data
Average Speed Operating Mode Distribution Generator
Source Bin Distribution Generator (SBDG)
Meteorology Generator
Tank Temperature Generator
Tank Fuel Generator
Lookup Total Activity Generator
Lookup Operating Mode Distribution Generator
Emission Calculators
On-Road Retrofit
Project-Domain Total Activity Generator
Project-Domain Operating Mode Distribution Generator (running exhaust)
Destination User Dataset
Copy Saved Generator Data
Server:
Database:
Create Database
Refresh
Aggregation and Data Handling
Do Not Perform Final Aggregation
Custom Input Database
Geographic B
Vehicles/Equi
On Roa
Road Type
Pollutants An
Manage Input
Strategies
Output
Genera
Select and Import Project-Level Data
start
Ed Glove...
For Gary ...
2 Micro...
Comman...
MOVES -...
10:19 AM

Creating a Project Database


MOVES Project Data Manager
Operating Mode Distribution
Age Distribution
Fuel Supply
Meteorology Data
Tools
I/M
RunSpec Summary
Database
Links
Link Source Types
Link Drive Schedules
Off-Network
Select or create a database to hold the imported data.
Server:
localhost
Database:
hdprojectexampleinput
Create Database
Refresh
Log:
Enter Database Name
Click to Create Database
Database
Done
start
Ed Glover...
for Gary ...
2 Micros...
Command...
MOVES - ...
10:44 AM

MOVES

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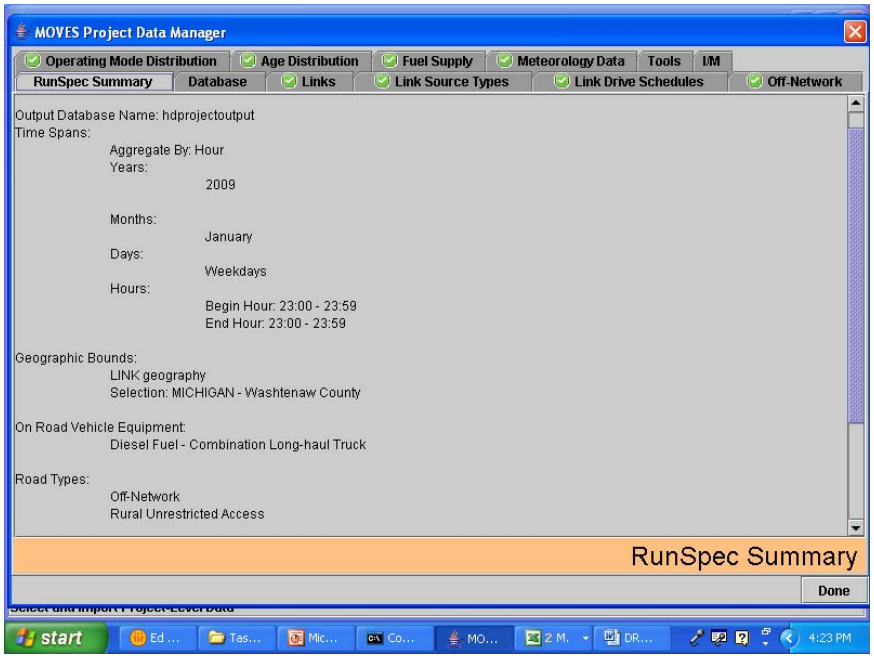
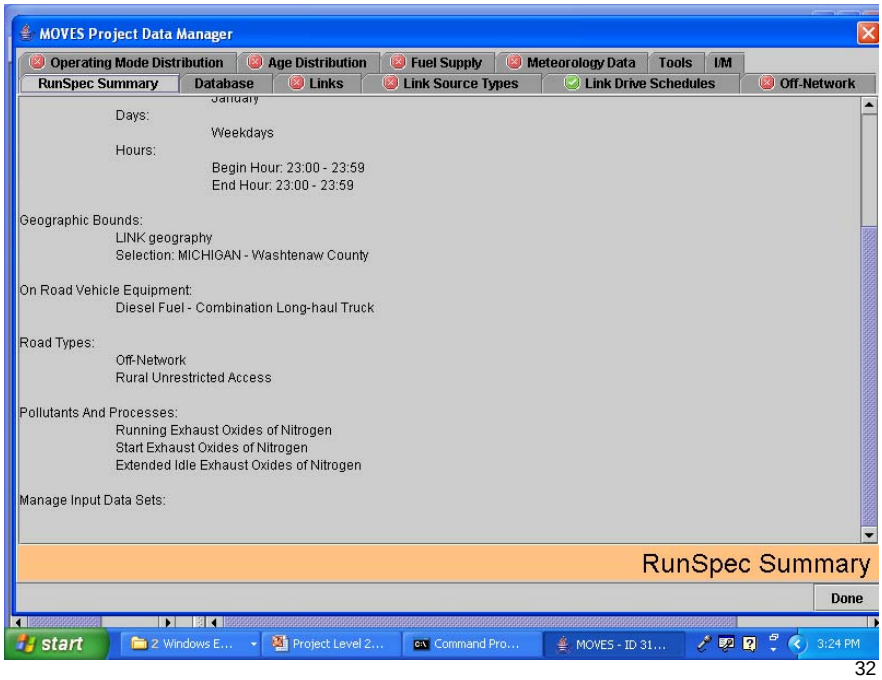
Project Database Tab

- **Create a Project Level Database**
  - Project level database will contain all of the user data for use by MOVES. During execution, MOVES does not 'read' data from Excel spreadsheets, but imports the data into a project level database.
  - Server is usually 'localhost'
  - Refresh button updates the list of databases
  - Create Database creates a new project level database
- **"Done" button**
  - This button merely closes the project level input GUI.


MOVES Project Data Manager
Operating Mode Distribution
Age Distribution
Fuel Supply
Meteorology Data
Tools
I/M
RunSpec Summary
Database
Links
Link Source Types
Link Drive Schedules
Off-Network
Output Database Name: hdprojectoutput
Time Spans:
Aggregate By: Hour
Years:
2009
Months:
January
Days:
Weekdays
Hours:
Begin Hour: 23:00 - 23:59
End Hour: 23:00 - 23:59
Geographic Bounds:
LINK geography
Selection: MICHIGAN - Washtenaw County
On Road Vehicle Equipment:
Diesel Fuel - Combination Long-haul Truck
Road Types:
Off-Network
Rural Unrestricted Access
RunSpec Summary
Done
start
4:23 PM

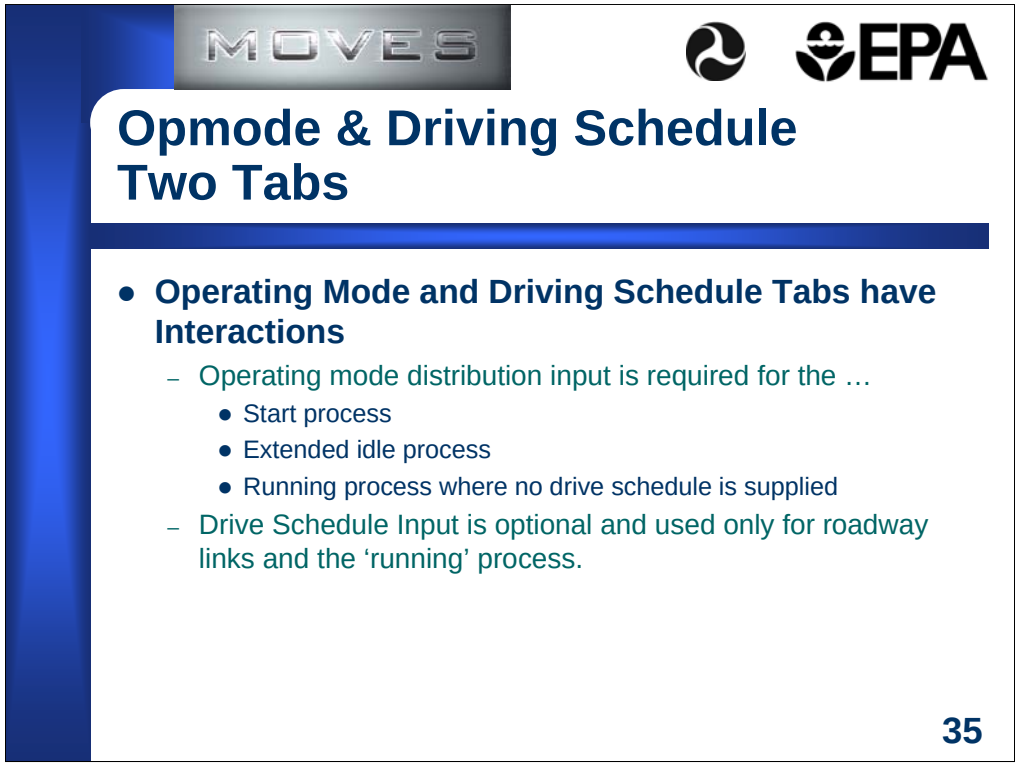

MOVES Project Data Manager
Operating Mode Distribution
Age Distribution
Fuel Supply
Meteorology Data
Tools
I/M
RunSpec Summary
Database
Links
Link Source Types
Link Drive Schedules
Off-Network
January
Days:
Weekdays
Hours:
Begin Hour: 23:00 - 23:59
End Hour: 23:00 - 23:59
Geographic Bounds:
LINK geography
Selection: MICHIGAN - Washtenaw County
On Road Vehicle Equipment:
Diesel Fuel - Combination Long-haul Truck
Road Types:
Off-Network
Rural Unrestricted Access
Pollutants And Processes:
Running Exhaust Oxides of Nitrogen
Start Exhaust Oxides of Nitrogen
Extended Idle Exhaust Oxides of Nitrogen
Manage Input Data Sets:
RunSpec Summary
Done
start
2 Windows E...
Project Level 2...
Command Pro...
MOVES - ID 31...
3:24 PM

MOVES

Runspec Tabs

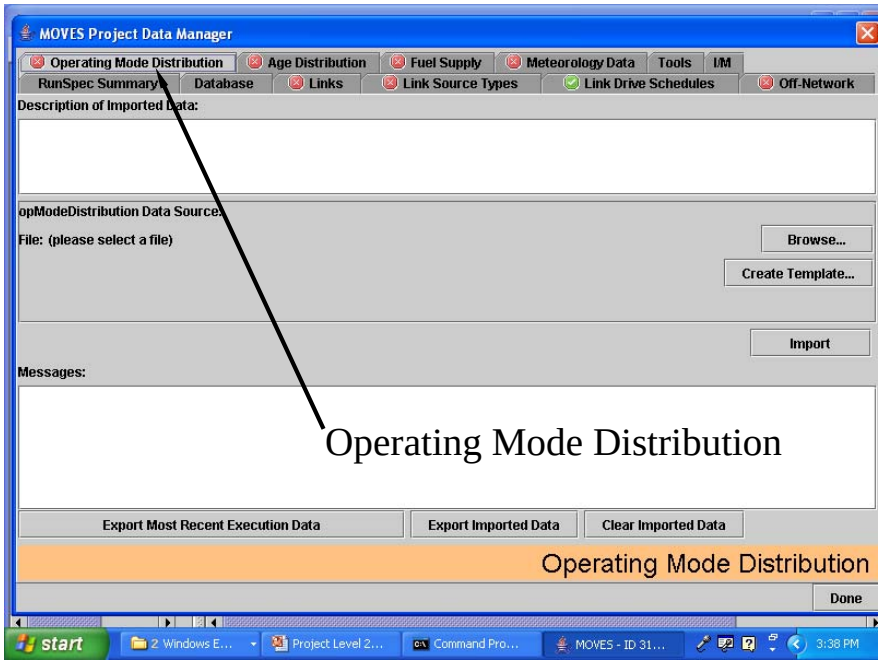
- **Runspec tab**
  - Echoes a summary of the runspec
    - Time
    - Geography
    - Vehicle types
    - Road types
    - Pollutants
    - Additional User Databases
  - Be careful of Runspec changes after you create a Project Database

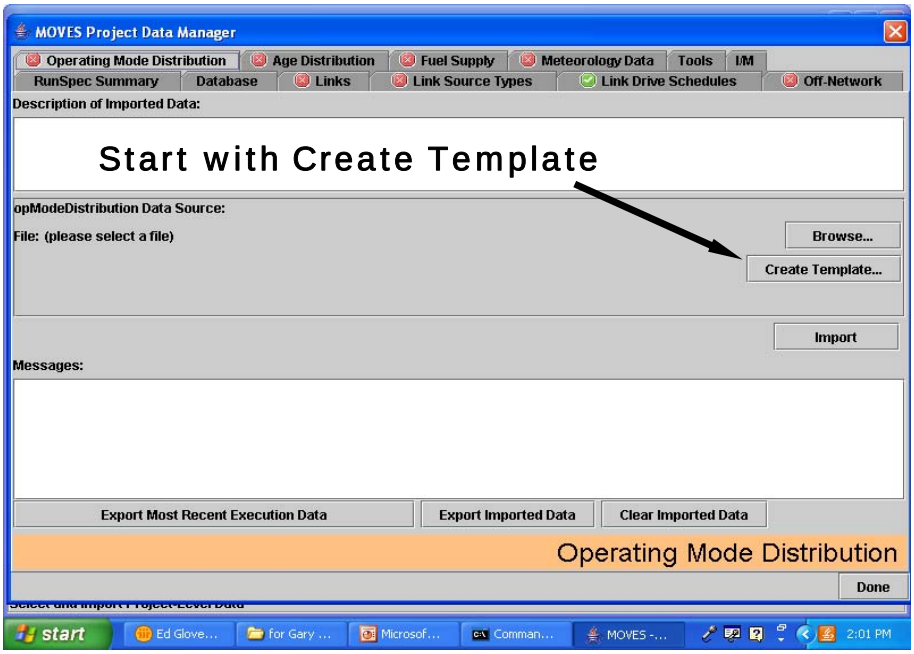
The **Operating Mode Distribution Importer** is used only in the **Project Domain Manager.** It allows the user to import operating mode fraction data for source types, hour / day combinations, roadway links and pollutant / process combinations that are included in the RunSpec and Project domain.



These data are entered as a distribution across operating modes. Operating modes are "modes"of vehicle activity that have distinct emission rates. For example, "running" activity has modes that are distinguished by their Vehicle Specific Power and instantaneous speed. "Start" activity has modes that are distinguished by the time the vehicle has been parked prior to the start ("soak time").

For a given source type, hour/day combination, roadway link and pollutant / process combination, the operating mode distribution must sum to one.


MOVES Project Data Manager
Operating Mode Distribution
Age Distribution
Fuel Supply
Meteorology Data
Tools
I/M
RunSpec Summary
Database
Links
Link Source Types
Link Drive Schedules
Off-Network
Description of Imported Data:
opModeDistribution Data Source:
File: (please select a file)
Browse...
Create Template...
Import
Messages:
Operating Mode Distribution
Export Most Recent Execution Data
Export Imported Data
Clear Imported Data
Operating Mode Distribution
Done
start
2 Windows E...
Project Level 2...
Command Pro...
MOVES - ID 31...
3:38 PM


MOVES Project Data Manager
Operating Mode Distribution
Age Distribution
Fuel Supply
Meteorology Data
Tools
I/M
RunSpec Summary
Database
Links
Link Source Types
Link Drive Schedules
Off-Network
Description of Imported Data:
Start with Create Template
opModeDistribution Data Source:
File: (please select a file)
Browse...
Create Template...
Import
Messages:
Export Most Recent Execution Data
Export Imported Data
Clear Imported Data
Operating Mode Distribution
Done
start
Ed Glove...
for Gary ...
Microsof...
Comman...
MOVES -...
2:01 PM

MOVES

EPA

Project Level Templates

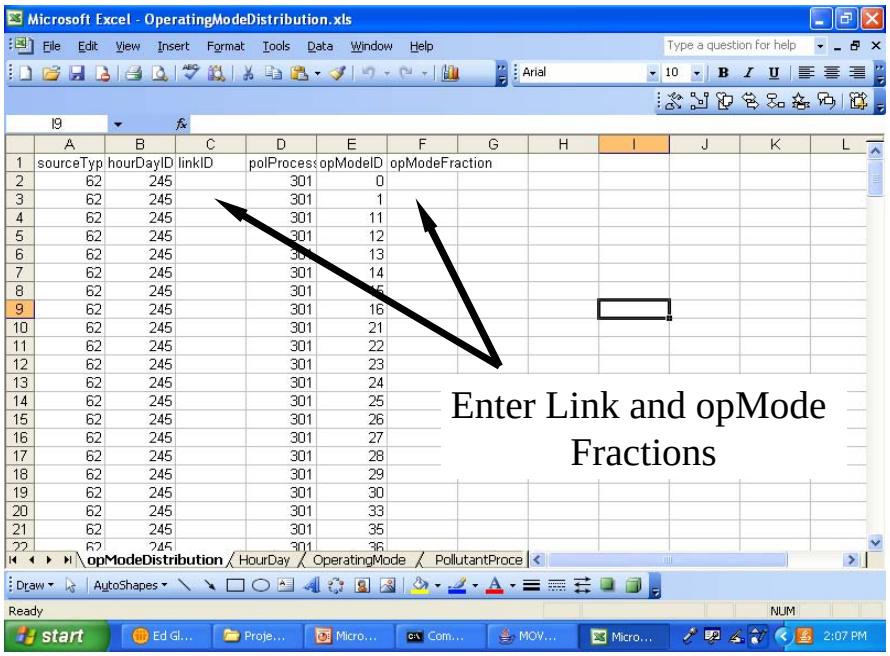
- Template button creates an Excel Workbook
- First tab (starting from the left) in the Workbook is where the user supplied data are entered. This is the 'active' worksheet.
- Remaining tabs define the required fields as an assistance to the user.
- It is recommended that the user utilize the Template function in the initial set-up of the project. However, after the project is established, 'active' worksheets may be collapsed into a single workbook.

MOVES

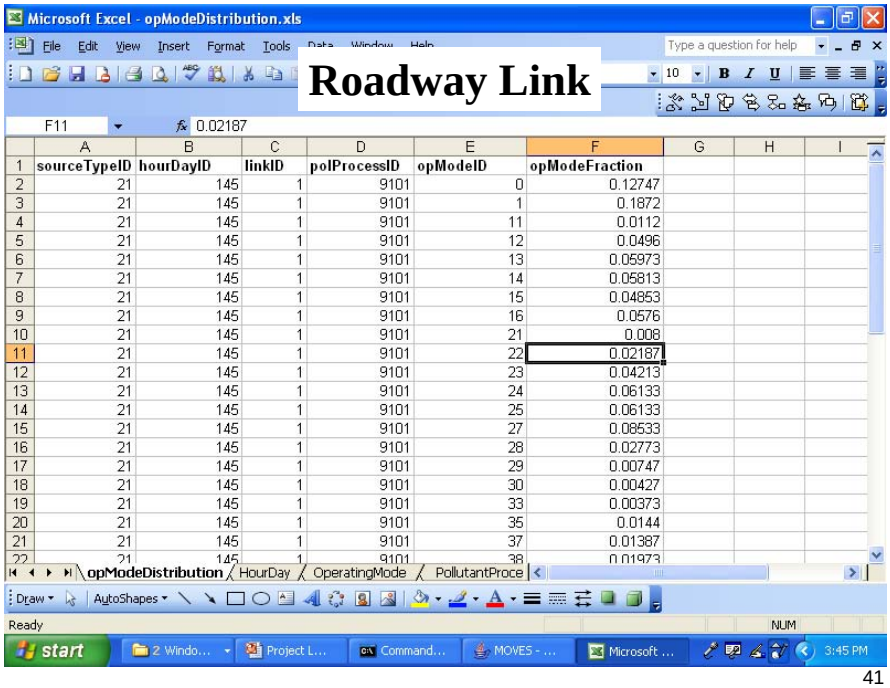
EPA

Operating Mode Distribution Data

- **Inputs must be supplied for each …**
  - Source Type
  - Hour / Day Combination
  - Project Link
  - Pollutant Process Combination
  - Operating Mode
- **Must sum to unity within a group**
- **Operating mode definitions vary by process**
  - 23 operating modes for running
  - 8 operating modes for start
  - 1 operating mode for extended idle
  - 16 operating modes for tire / brake process

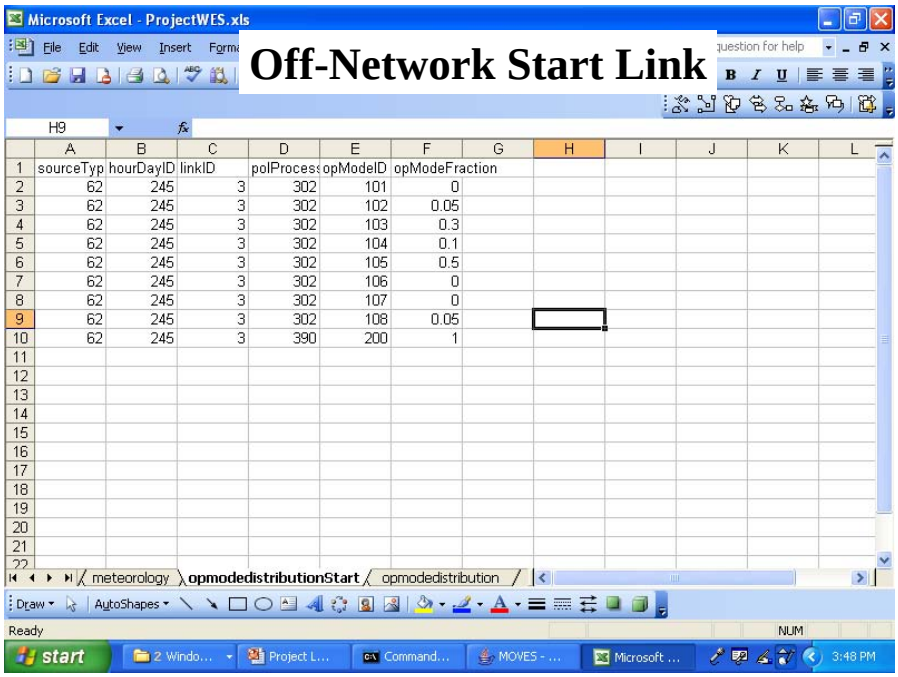

Microsoft Excel - OperatingModeDistribution.xls
File Edit View Insert Format Tools Data Window Help
Type a question for help
Arial 10
I9
sourceTyp hourDayID linkID polProces opModeID opModeFraction
62 245 301 0
62 245 301 1
62 245 301 11
62 245 301 12
62 245 301 13
62 245 301 14
62 245 301 16
62 245 301 21
62 245 301 22
62 245 301 23
62 245 301 24
62 245 301 25
62 245 301 26
62 245 301 27
62 245 301 28
62 245 301 29
62 245 301 30
62 245 301 33
62 245 301 35
62 245 301 36
opModeDistribution HourDay OperatingMode PollutantProce
Draw AutoShapes
Ready
NUM
start
2:07 PM
Enter Link and opMode Fractions

Roadway Link

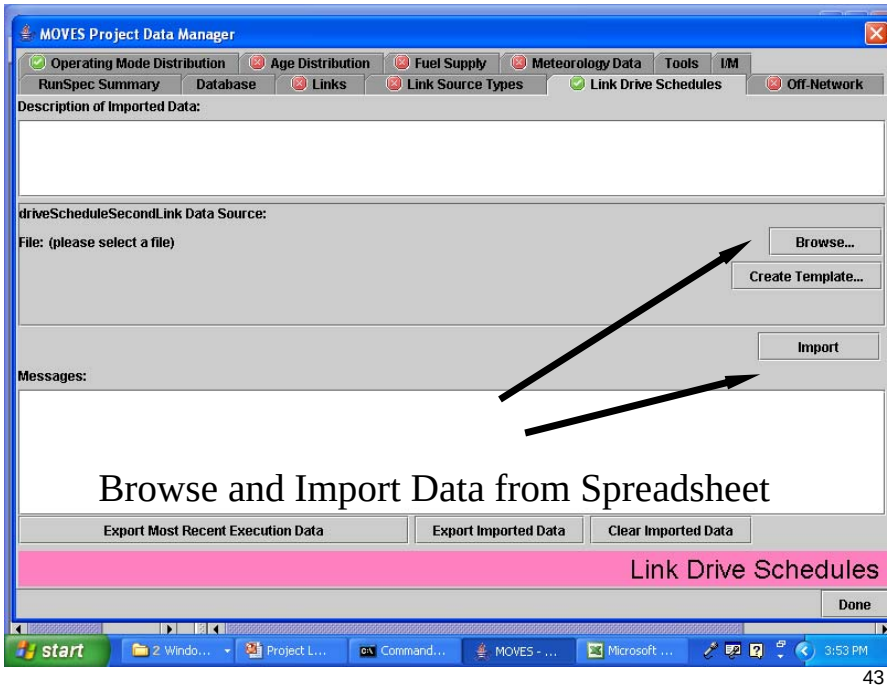


	A	B	C	D	E	F	G	H	I
1	sourceTypeID	hourDayID	linkID	polProcessID	opModeID	opModeFraction			
2	21	145	1	9101	0	0.12747			
3	21	145	1	9101	1	0.1872			
4	21	145	1	9101	11	0.0112			
5	21	145	1	9101	12	0.0496			
6	21	145	1	9101	13	0.05973			
7	21	145	1	9101	14	0.05813			
8	21	145	1	9101	15	0.04853			
9	21	145	1	9101	16	0.0576			
10	21	145	1	9101	21	0.008			
11	21	145	1	9101	22	0.02187			
12	21	145	1	9101	23	0.04213			
13	21	145	1	9101	24	0.06133			
14	21	145	1	9101	25	0.06133			
15	21	145	1	9101	27	0.08533			
16	21	145	1	9101	28	0.02773			
17	21	145	1	9101	29	0.00747			
18	21	145	1	9101	30	0.00427			
19	21	145	1	9101	33	0.00373			
20	21	145	1	9101	35	0.0144			
21	21	145	1	9101	37	0.01387			
22	21	145	1	9101	38	0.01973			

Off-Network Start Link



	A	B	C	D	E	F	G	H	I	J	K	L
1	sourceTyp	hourDayID	linkID	polProcess	opModeID	opModeFraction						
2	62	245	3	302	101	0						
3	62	245	3	302	102	0.05						
4	62	245	3	302	103	0.3						
5	62	245	3	302	104	0.1						
6	62	245	3	302	105	0.5						
7	62	245	3	302	106	0						
8	62	245	3	302	107	0						
9	62	245	3	302	108	0.05						
10	62	245	3	390	200	1						
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												

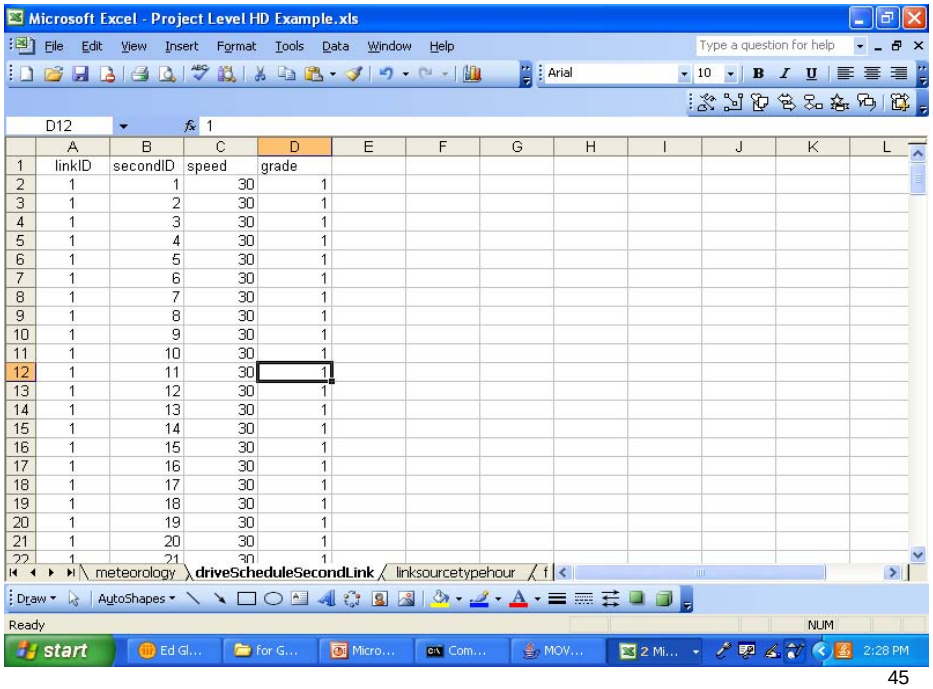

MOVES Project Data Manager
Operating Mode Distribution
Age Distribution
Fuel Supply
Meteorology Data
Tools
I/M
RunSpec Summary
Database
Links
Link Source Types
Link Drive Schedules
Off-Network
Description of Imported Data:
driveScheduleSecondLink Data Source:
File: (please select a file)
Browse...
Create Template...
Import
Messages:
Browse and Import Data from Spreadsheet
Export Most Recent Execution Data
Export Imported Data
Clear Imported Data
Link Drive Schedules
Done
start
2 Windo...
Project L...
Command...
MOVES - ...
Microsoft ...
3:53 PM

MOVES

EPA

Link Drive Schedule Rules

- Link Drive Schedules is an optional input for roadway links only.
- MOVES converts drive schedule data into operating mode distributions
- Default data are not available
- User supplies speed / time / percent grade data for each second for each link
- If data for one roadway link is supplied then data for ALL roadway links must be supplied
- Operating Mode Distribution data will over-ride Link Drive Schedule data if both are present

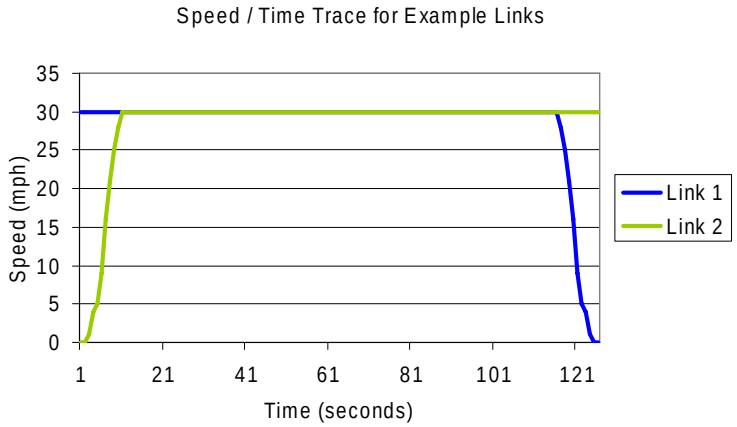


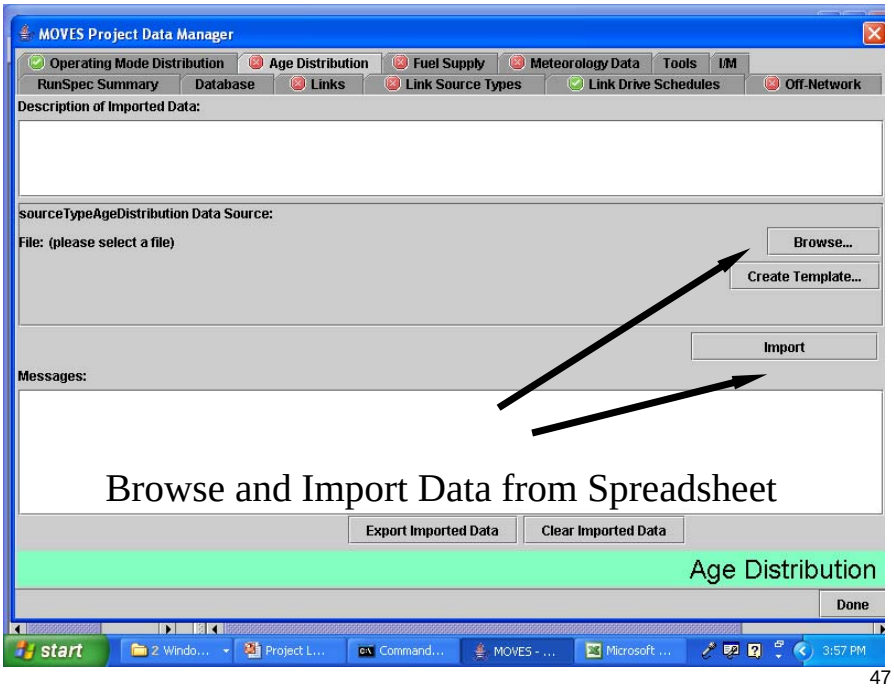
	A	B	C	D
1	linkID	secondID	speed	grade
2	1	1	30	1
3	1	2	30	1
4	1	3	30	1
5	1	4	30	1
6	1	5	30	1
7	1	6	30	1
8	1	7	30	1
9	1	8	30	1
10	1	9	30	1
11	1	10	30	1
12	1	11	30	1
13	1	12	30	1
14	1	13	30	1
15	1	14	30	1
16	1	15	30	1
17	1	16	30	1
18	1	17	30	1
19	1	18	30	1
20	1	19	30	1
21	1	20	30	1
22	1	21	30	1

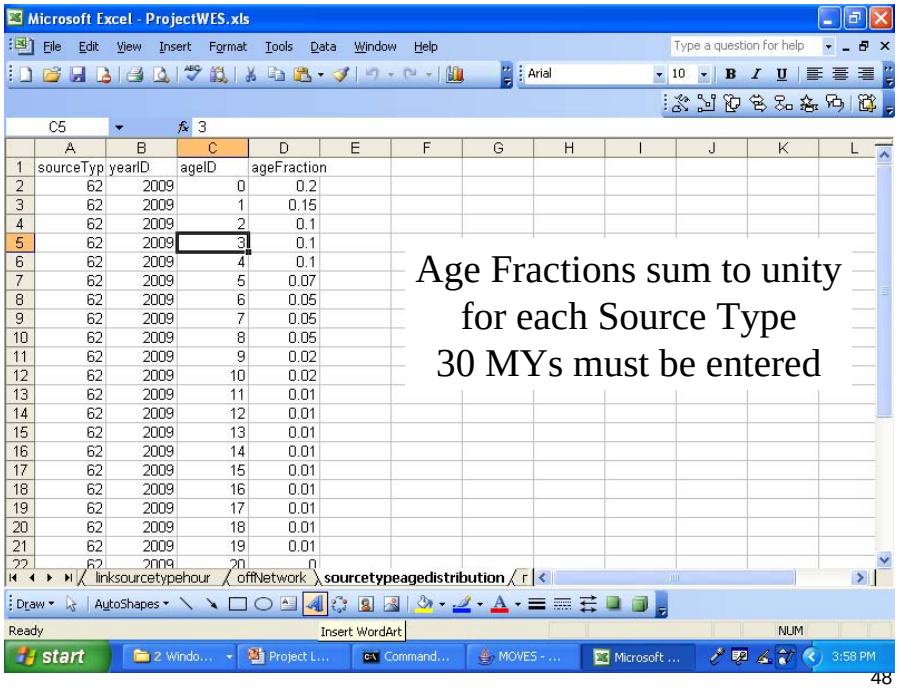
MOVES

EPA

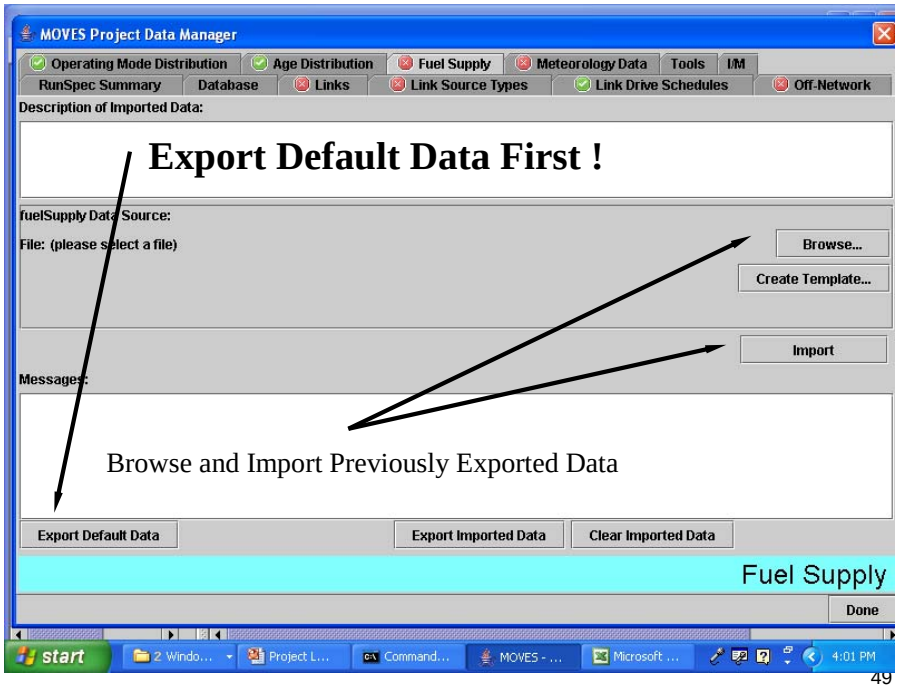
Speed / Time Trace for Example Links

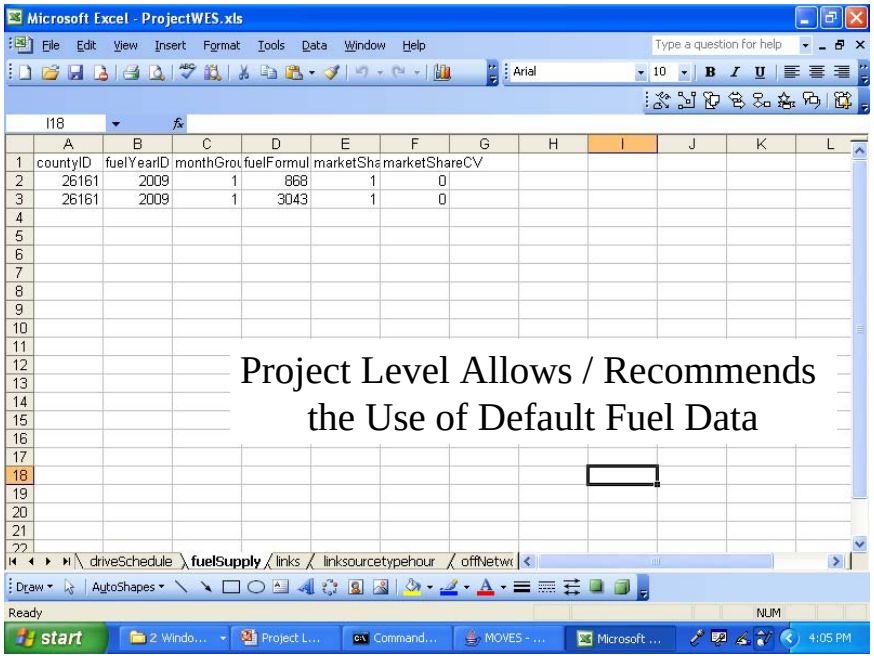


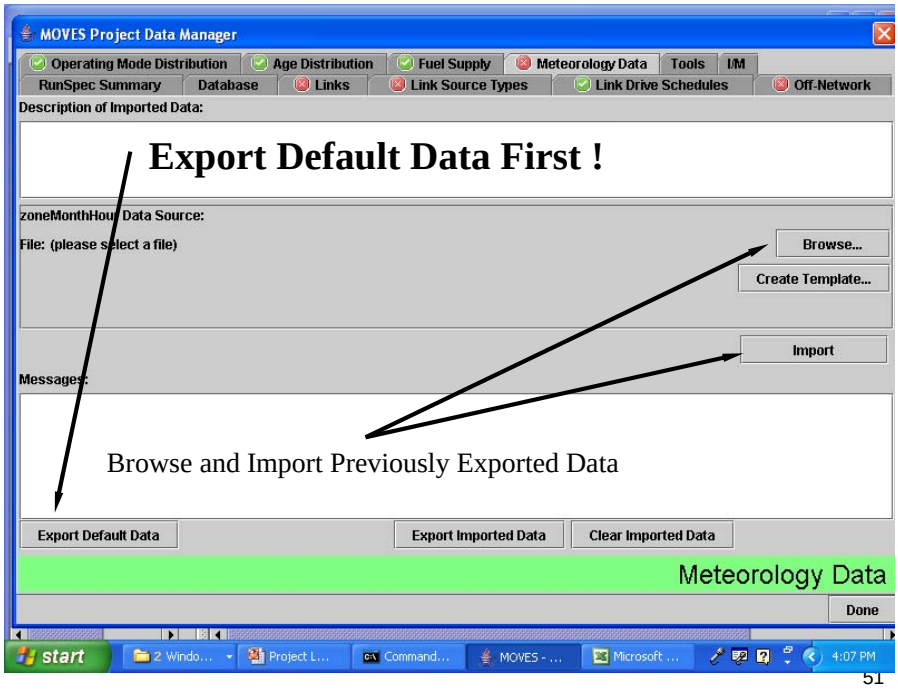

MOVES Project Data Manager
Operating Mode Distribution
Age Distribution
Fuel Supply
Meteorology Data
Tools
I/M
RunSpec Summary
Database
Links
Link Source Types
Link Drive Schedules
Off-Network
Description of Imported Data:
sourceTypeAgeDistribution Data Source:
File: (please select a file)
Browse...
Create Template...
Import
Messages:
Browse and Import Data from Spreadsheet
Export Imported Data
Clear Imported Data
Age Distribution
Done
start
2 Windo...
Project L...
Command...
MOVES - ...
Microsoft ...
3:57 PM

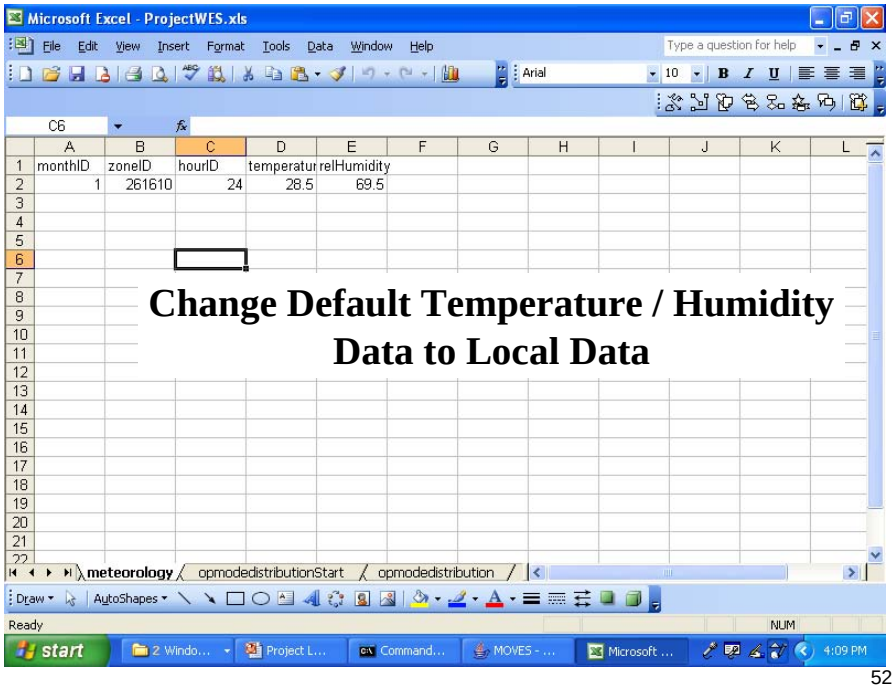


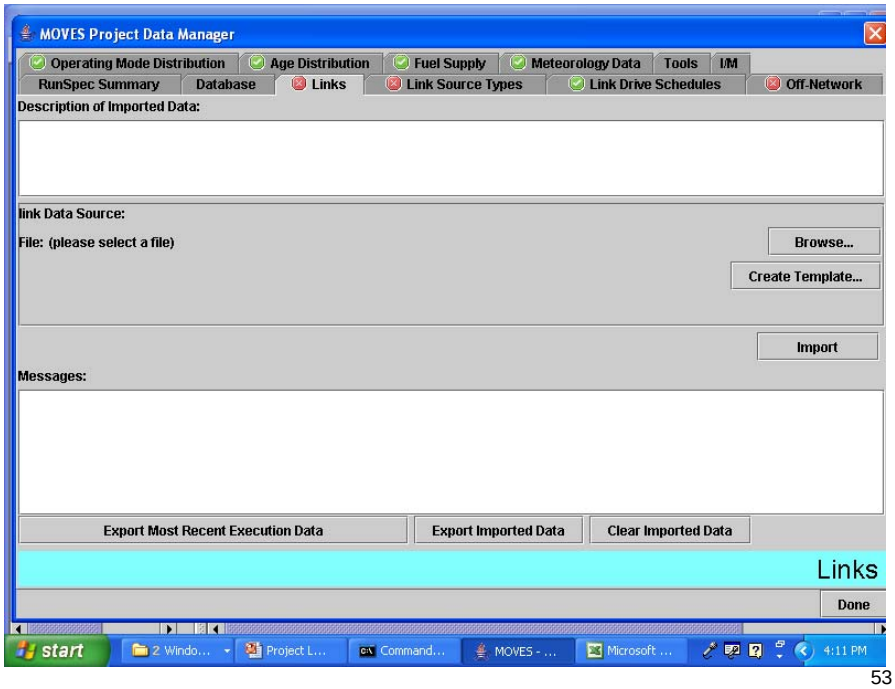
Age Fractions sum to unity
for each Source Type
30 MYs must be entered


MOVES Project Data Manager
Operating Mode Distribution
Age Distribution
Fuel Supply
Meteorology Data
Tools
I/M
RunSpec Summary
Database
Links
Link Source Types
Link Drive Schedules
Off-Network
Description of Imported Data:
Export Default Data First !
fuelSupply Data Source:
File: (please select a file)
Browse...
Create Template...
Import
Messages:
Browse and Import Previously Exported Data
Export Default Data
Export Imported Data
Clear Imported Data
Fuel Supply
Done
start
2 Windo...
Project L...
Command...
MOVES - ...
Microsoft ...
4:01 PM


Microsoft Excel - ProjectWES.xls
File Edit View Insert Format Tools Data Window Help
Type a question for help
Arial 10
I18
countyID fuelYearID monthGrou fuelFormul marketSha marketShareCV
26161 2009 1 868 1 0
26161 2009 1 3043 1 0
Project Level Allows / Recommends the Use of Default Fuel Data
driveSchedule fuelSupply links linksourcetypehour offNetw
Draw AutoShapes
Ready
NUM
start
2 Windo... Project L... Command... MOVES - ... Microsoft ... 4:05 PM

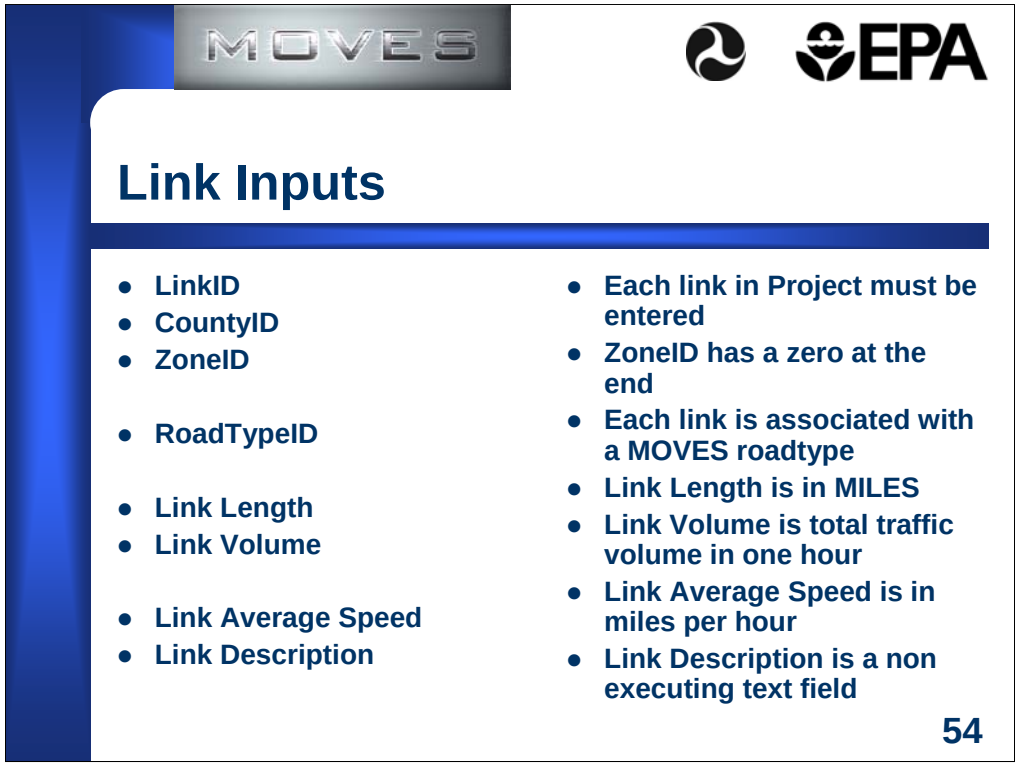

MOVES Project Data Manager
Operating Mode Distribution
Age Distribution
Fuel Supply
Meteorology Data
Tools
I/M
RunSpec Summary
Database
Links
Link Source Types
Link Drive Schedules
Off-Network
Description of Imported Data:
Export Default Data First !
zoneMonthHour Data Source:
File: (please select a file)
Browse...
Create Template...
Import
Messages:
Browse and Import Previously Exported Data
Export Default Data
Export Imported Data
Clear Imported Data
Meteorology Data
Done
start
2 Windo...
Project L...
Command...
MOVES - ...
Microsoft ...
4:07 PM


Microsoft Excel - ProjectWES.xls
File Edit View Insert Format Tools Data Window Help
Type a question for help
Arial
10
C6
A B C D E F G H I J K L
1 monthID zoneID hourID temperatur relHumidity
2 1 261610 24 28.5 69.5
Change Default Temperature / Humidity Data to Local Data
meteorology opmodedistributionStart opmodedistribution
Draw AutoShapes
Ready
NUM
start
2 Windo... Project L... Command... MOVES - ... Microsoft ...
4:09 PM



53

The **Links Importer** is used only in the **Project Domain Manager**. It allows the user to define individual roadway links. The MOVES links need not correspond to traffic modeling "links" but each link should be uniform in its activity as described by the following parameters.

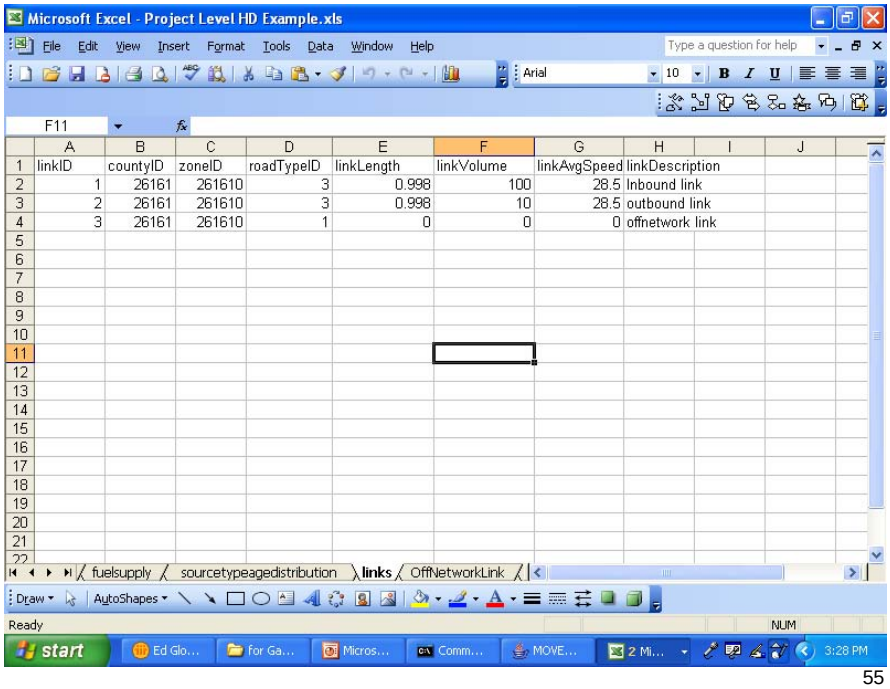


Each link requires a linkID (i.e., a unique integer between 1 and 99999 that is used to reference the link in the program),

countyID, zoneID, and roadTypeID

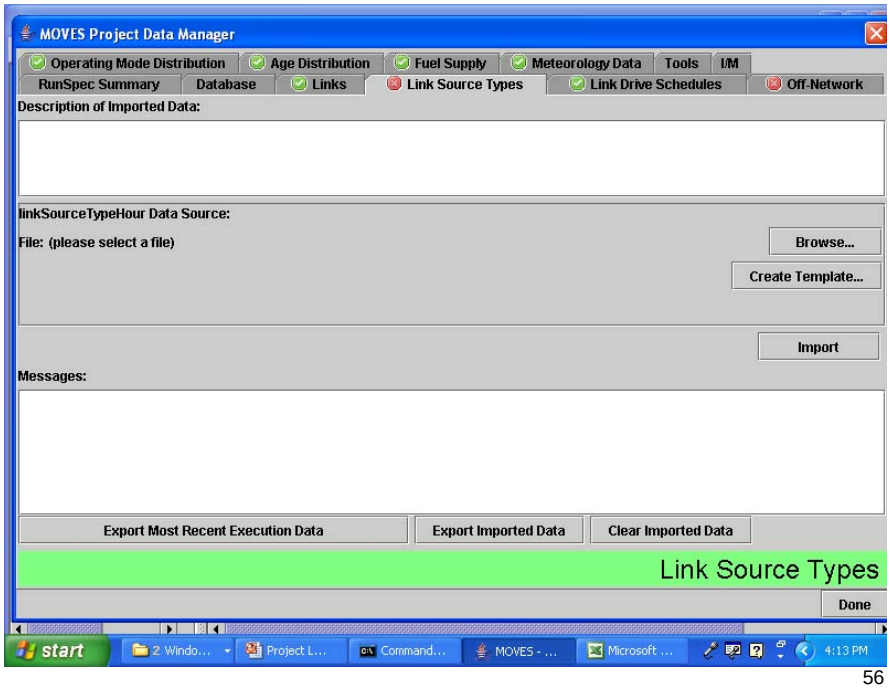
(these also must be specified in the Runspec or an error will occur),

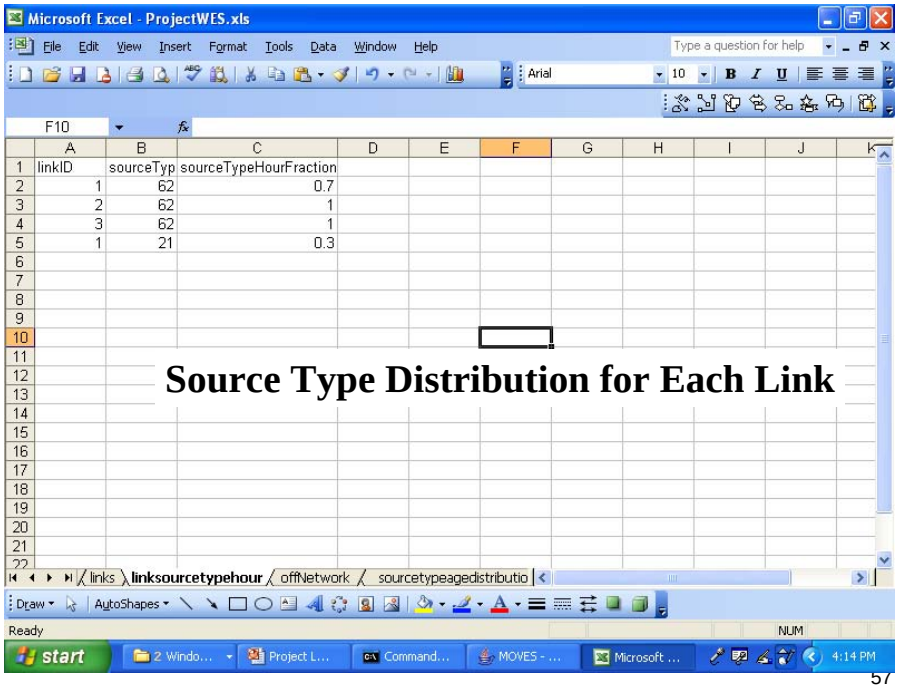
the length of the roadway link in units of miles, the traffic volume on the roadway link in units of vehicles per hour, and the average speed of all of the vehicles on the roadway link in the given hour. The link description field is a text field included for reference and has no impact on the calculations.



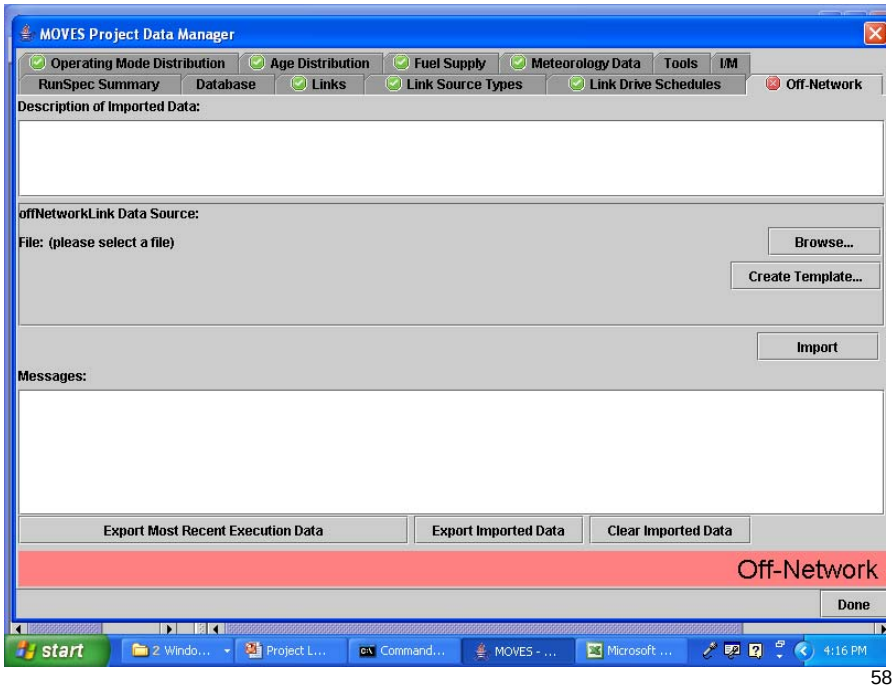
55

A project may include a single off-network (parking lot or other non-road) link. For an off-network link, the user should enter a value of zero for link length, link volume and link average speed.


MOVES Project Data Manager
Operating Mode Distribution
Age Distribution
Fuel Supply
Meteorology Data
Tools
I/M
RunSpec Summary
Database
Links
Link Source Types
Link Drive Schedules
Off-Network
Description of Imported Data:
linkSourceTypeHour Data Source:
File: (please select a file)
Browse...
Create Template...
Import
Messages:
Export Most Recent Execution Data
Export Imported Data
Clear Imported Data
Link Source Types
Done
start
2 Windo...
Project L...
Command...
MOVES - ...
Microsoft ...
4:13 PM



Source Type Distribution for Each Link

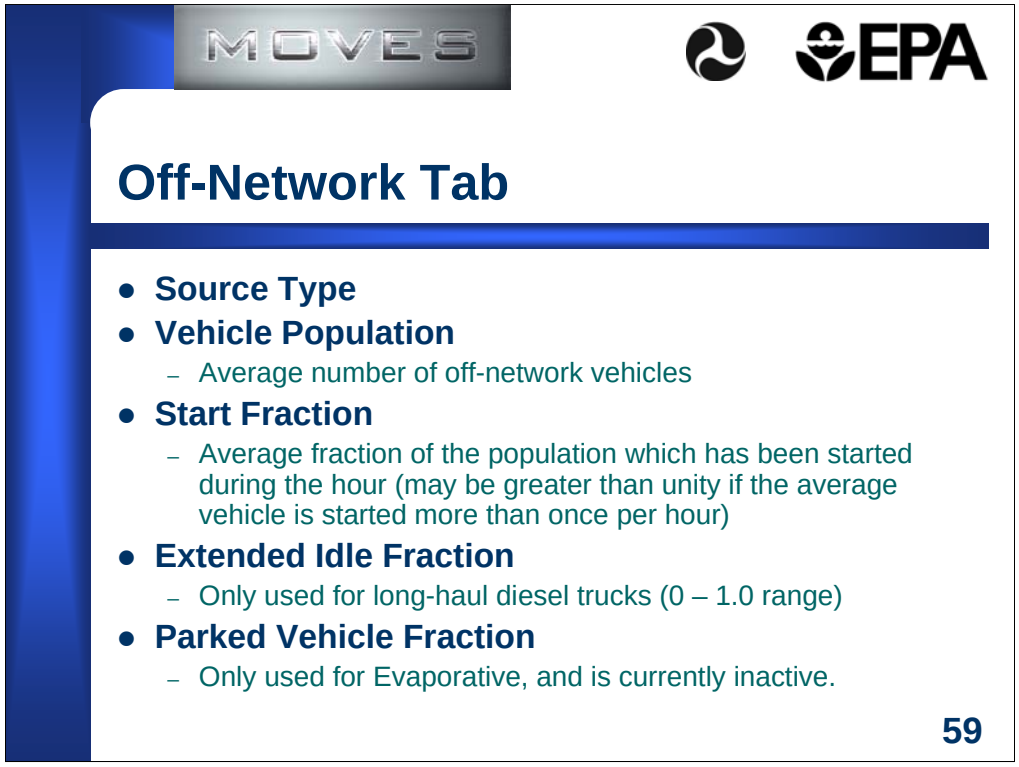


The **Off Network Importer** is used only in the **Project Domain Manager**. It provides information about vehicles are not driving on the project links, but still contribute to the project emissions. For each source type in the RunSpec, 'vehicle population' is the average number of "off network" vehicles.

The 'start fraction' field is a number from 0 to 1.0 which specifies the fraction of this population which has a 'start' operation in the given hour.

The 'extendedIdle fraction' field is a number from 0 to 1.0 which specifies the fraction of the population which has had an 'extended idle' operation in the given hour.

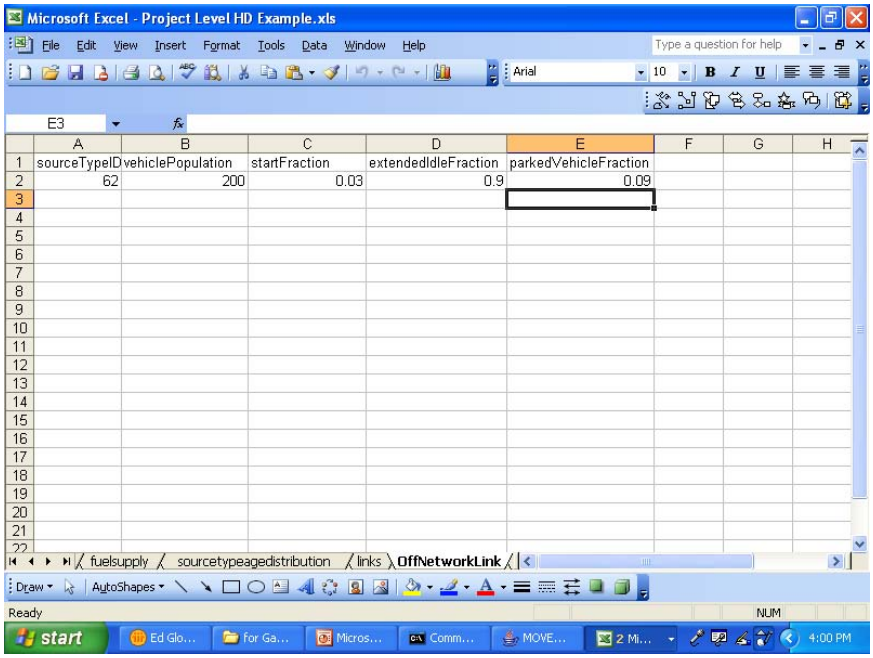
Finally, the 'parked vehicle fraction' field is a number from 0 to 1.0 which specifies the fraction of the 'vehicle population' which have been parked in the given hour.



For example, a vehicle population of 10 long-haul combination trucks with a start fraction of 0.5, an extended idle fraction of 0.25 and a parked vehicle fraction of 0.5 implies that the project includes the emissions associated with 5 starts, 150 minutes of extended idling and 300 minutes of parking for this sourcetype.

Note Draft MOVES2009 computes extended idle emissions only for long-haul combination trucks, not for other sourcetypes; thus the extendedIdleFraction is ignored for sourcetypeids other than 62.

Note Draft MOVES2009 does not compute evaporative emissions at the Project Domain/Scale; thus, the "parked vehicle fraction" is ignored.

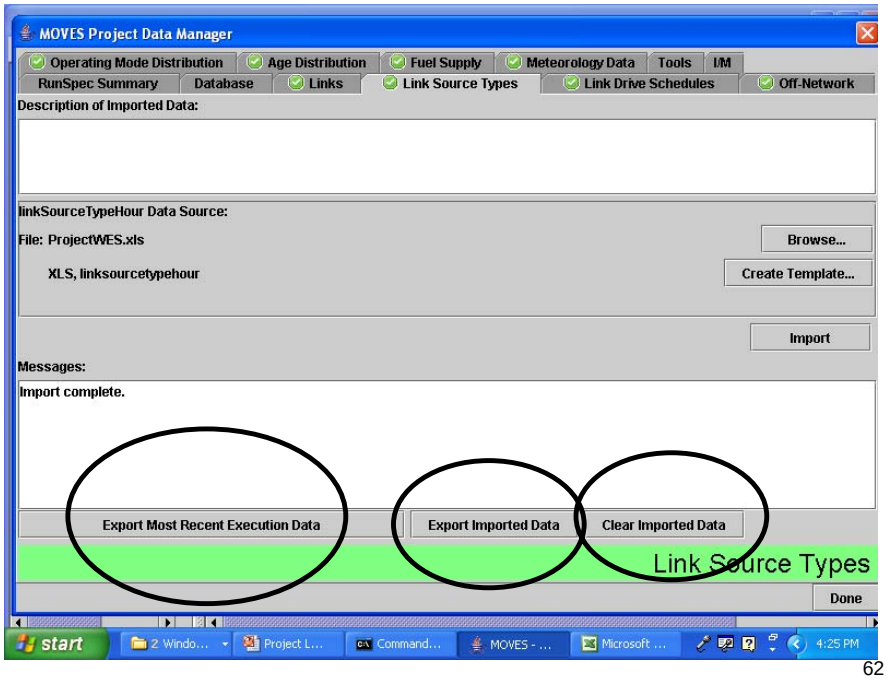

Microsoft Excel - Project Level HD Example.xls
File Edit View Insert Format Tools Data Window Help
Type a question for help
Arial 10
E3
sourceTypeID vehiclePopulation startFraction extendedIdleFraction parkedVehicleFraction
62 200 0.03 0.9 0.09
fuelsupply sourcetypeagedistribution links OffNetworkLink
Draw AutoShapes
Ready
NUM
start
4:00 PM

MOVES

EPA

Project GUI Buttons

- **Export Default Data**
  - Fuel Supply and Meteorology tabs only
- **Export Most Recent Execution Data**
  - Exports results from a previous MOVES run
  - MOVES Execution Data must exist
  - Exports to an Excel Spreadsheet
  - Might be useful for building additional project level inputs
- **Export Imported Data**
  - Exports data contained in the project level database back to an Excel Spreadsheet
  - Useful for checking data / debugging


MOVES Project Data Manager
Operating Mode Distribution
Age Distribution
Fuel Supply
Meteorology Data
Tools
I/M
RunSpec Summary
Database
Links
Link Source Types
Link Drive Schedules
Off-Network
Description of Imported Data:
linkSourceTypeHour Data Source:
File: ProjectWES.xls
Browse...
XLS, linksourcetypehour
Create Template...
Import
Messages:
Import complete.
Export Most Recent Execution Data
Export Imported Data
Clear Imported Data
Link Source Types
Done
start
4:25 PM

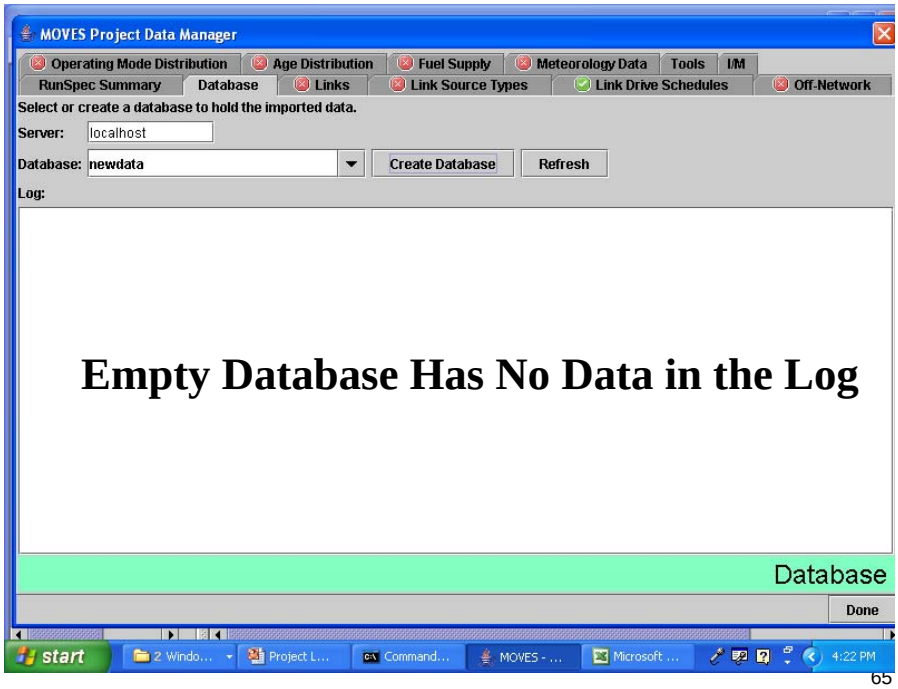
Project GUI Buttons (cont.)

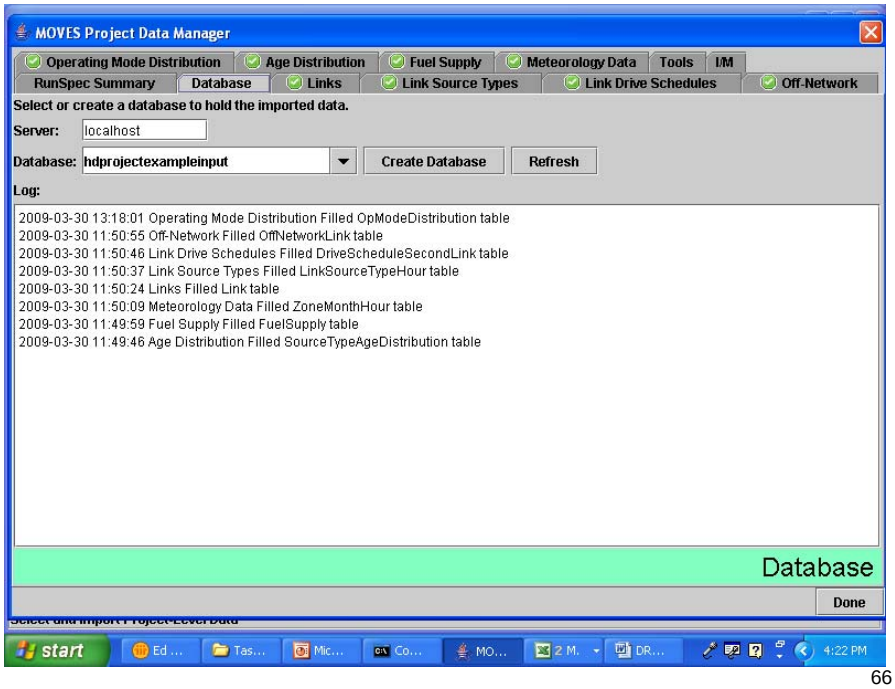
- **Clear Imported Data**
  - Wipes out data from the project level database for a selected tab.
  - Allows the user to get rid of selected data in their project level database.
  - Use this button if …
    - The inputs for a particular table have changed. Wipe out the old table before IMPORTING the new table
    - The inputs for the Runspec have changed. Wipe out all of the project level tables before IMPORTING the new tables.

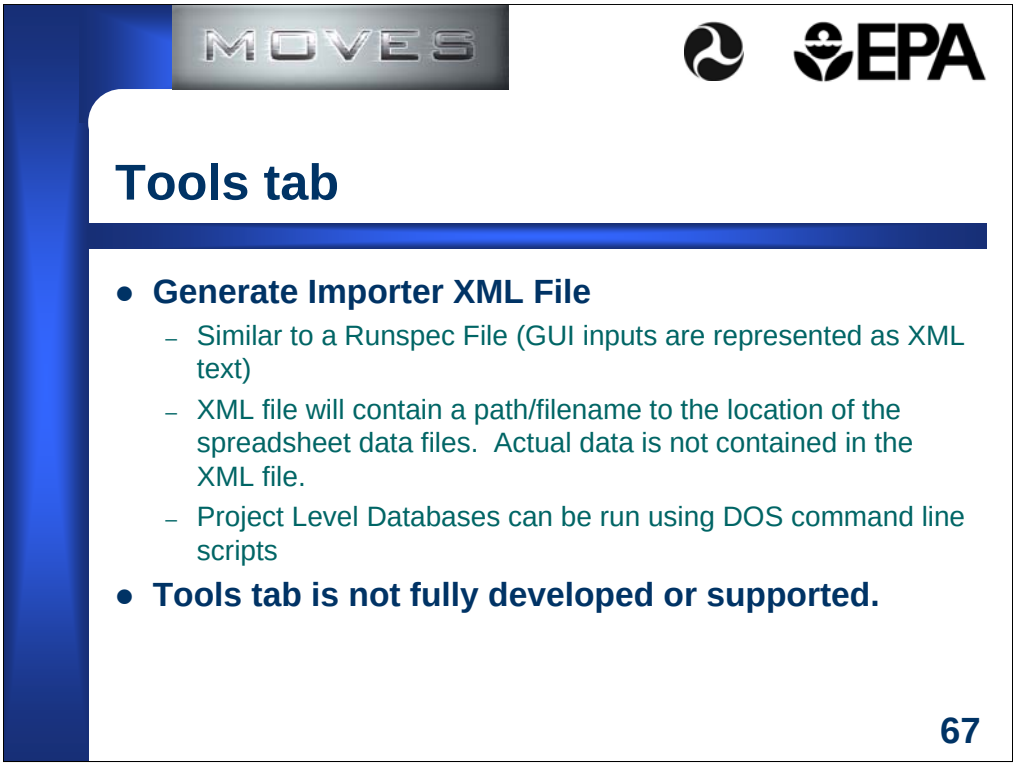
MOVES

Database Tab

- **User Provides the Name of the Database in this GUI Window**
- **Provides a Log of the Project Level Data Import Activity**
  - Date
  - Time
  - Name of the Database Table


MOVES Project Data Manager
Operating Mode Distribution
Age Distribution
Fuel Supply
Meteorology Data
Tools
I/M
RunSpec Summary
Database
Links
Link Source Types
Link Drive Schedules
Off-Network
Select or create a database to hold the imported data.
Server:
localhost
Database:
newdata
Create Database
Refresh
Log:
Empty Database Has No Data in the Log
Database
Done
start
2 Windo...
Project L...
Command...
MOVES - ...
Microsoft ...
4:22 PM


MOVES Project Data Manager
Operating Mode Distribution
Age Distribution
Fuel Supply
Meteorology Data
Tools
I/M
RunSpec Summary
Database
Links
Link Source Types
Link Drive Schedules
Off-Network
Select or create a database to hold the imported data.
Server:
localhost
Database:
hdprojectexampleinput
Create Database
Refresh
Log:
2009-03-30 13:18:01 Operating Mode Distribution Filled OpModeDistribution table
2009-03-30 11:50:55 Off-Network Filled OffNetworkLink table
2009-03-30 11:50:46 Link Drive Schedules Filled DriveScheduleSecondLink table
2009-03-30 11:50:37 Link Source Types Filled LinkSourceTypeHour table
2009-03-30 11:50:24 Links Filled Link table
2009-03-30 11:50:09 Meteorology Data Filled ZoneMonthHour table
2009-03-30 11:49:59 Fuel Supply Filled FuelSupply table
2009-03-30 11:49:46 Age Distribution Filled SourceTypeAgeDistribution table
Database
Done
start
4:22 PM



setenv

java gov.epa.otaq.moves.master.commandline.MOVESCommandLine -e DEBUG -i Task816CountyDataManager\importAllFromTemplates.xml

Command Line Example

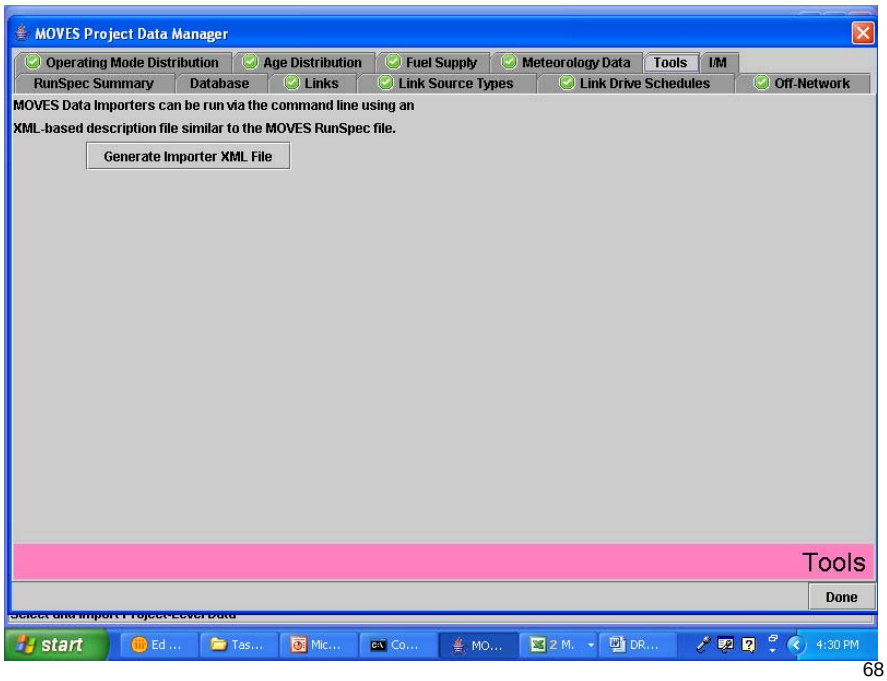
Once the GUI is used to create an importer XML file, it can be edited and executed via the command line. Remember that when using the command line, text output is not sent to the screen but instead stored in MOVESBatch.log.

An example command line is:

setenv

java gov.epa.otaq.moves.master.commandline.MOVESCommandLine -e DEBUG -i Task816CountyDataManager\importAllFromTemplates.xml

Be sure to place all of this on one line. The “-e DEBUG” portion ensures that all messages will be captured, even if just informational. The “-i” option directs MOVES to the XML file that describes the import actions to occur. Note that this XML file essentially contains a RunSpec within it, thus allowing wildcards even when done via the command line.


MOVES Project Data Manager
Operating Mode Distribution
Age Distribution
Fuel Supply
Meteorology Data
Tools
I/M
RunSpec Summary
Database
Links
Link Source Types
Link Drive Schedules
Off-Network
MOVES Data Importers can be run via the command line using an
XML-based description file similar to the MOVES RunSpec file.
Generate Importer XML File
Tools
Done
start
4:30 PM

MOVES

EPA

Project Level Output

- Results are placed in the standard MOVESOutput table.
- LinkID is added to each record if road type is selected in the MOVES output GUI.